THE ATTRIBUTIVE THEORY OF QUALITY: A MODEL FOR QUALITY MEASUREMENT IN HIGHER EDUCATION

By

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The purpose of this study was to develop and advance a theoretical basis for defining and measuring quality, specifically as it related to higher education institutions. The need for such a theory became evident after an extensive review of the related literature demonstrated absence of any such theoretical bases; an abundance of vague, inconclusive, and conflicting definitions; and an incomplete set of measurement criteria.

Misconstruing quality as an independent, albeit abstract, entity and attempting to define and measure it within this frame of reference, emerged as the root of the problem. Analysis of this finding led to the formulation of the fundamental proposition of the Attributive Theory of Quality, namely, that quality does not exist in isolation and as an

independent entity; rather, it only finds existence in relation to the phenomenon to which it is attributed. This theory defines quality as the interactive sum of all the necessary and sufficient properties that comprise a phenomenon.

The Attributive Theory of Quality views any phenomenon as a system. Thus, to illustrate the operationalization of the proposed theory, a model--based on the general system theory--was developed to calculate the interactive sum of the properties (subsystems/components) of the phenomenon (a community college library). The illustrative data (values and weights) were provided by fifteen librarians at five community college libraries (three at each location). The results produced by the model were subsequently compared with the data obtained from a panel of five accreditation experts assigned by the Southern Association of Colleges and Schools.

The intersubjective approach to research mandated the selection of experts for both testing and verification. The arithmetic mean was accepted as the consensus figure for the data, and verification of results was defined as an 80% agreement between the results of the model and the panel's opinion. The comparison demonstrated a 100% agreement between rankings and less than 10% difference between numeric values generated by the model and assigned by the panel, thus upholding the validity of the theory and adequacy of the illustration. Further research, however, is needed to

identify system components and establish parameters for weights and values.

CHAPTER I
INTRODUCTION

> There is nothing more difficult to take in hand, more perilous to conduct, or more uncertain in its success, than to take the lead in the introduction of a new order of things.
>
> Niccolo Machiavelli (1513)
> (In Young, 1983, p. 1)

Along with the other sectors of the society, American higher education has been significantly affected by the intense socio-economic changes of the 1980s. Resources are dwindling, and the competition by business and industry in providing higher education to the work force is increasing (Bok, 1986; Cross, 1987). State boards of higher education, made stronger in the 1970s, have moved into areas such as curriculum quality control, and all three branches of the federal government have found ways and the means of imposing their views on the institutions (Stauffer, 1981).

These changes have resulted in increasing public demand for accountability from institutions of higher education, which in turn has, once more, focused attention on "quality" which traditionally has been the primary touchstone of education. Astin (1985a), Astin and Solmon (1981), Bowen (1974), COPA (1986), Finn (1980), Freedman (1987), Rathburn (1982), and other sources have acknowledged

that quality and its related issues will be the primary and enduring concern and preoccupation of educators and the public alike. More than any other factor, academic quality will determine "not simply the prosperity of the institutions, but how important a role colleges and universities will play in American life through the end of this century" (Stauffer, 1981, p. 5). Quality measurement will change from an institutional concern to a national priority (Ashworth, 1979). A proliferation of evaluation activities in higher education focusing on maintenance and improvement of quality (Craven, 1980) and appeals for further involvement of accreditation bodies (COPA, 1986) are clear evidence of this trend. These efforts, however, have not been fruitful.

Although the term quality is one of the most exhaustively used terms of everyday life, it has not yet been accurately or acceptably defined, measured, or tested.

> While many individuals and organizations are seeking better ways to promote excellence in our schools and colleges, very few have taken the trouble to define what they mean by excellence [and quality] in the first place. Despite this inattention to definition, there are several conceptions of excellence that are implicit in our time-honored educational policies and practices. (Astin, 1985a, p. ix)

Attempts to capture the concept of quality have resulted in a wide range of interpretations, from philosophical discourses to operational definitions. Lawrence and Green (1980) stated that in most cases the

result of these labors has been an agreement that quality is a "subjective" judgement by an individual based on some supporting evidence. Rathburn (1982) maintained that "researchers in higher education have noticeably refrained from providing a constitutive definition of educational quality but have, through research design and choice of various evaluative criteria, operationally defined the concept" (p. 2). Some of these criteria have been library resources, selectivity, quality of students, students' success, and faculty qualifications and publications.

A common method of defining and measuring the quality of the institutions of higher education, dating back to the early twentieth century, has been institutional ranking. According to Solmon (1981) this practice

> seems to have developed from the American interest in excellence per se and in competition. Just as Americans are interested in the top ten movies of all time, in the largest corporation in any year, and so on, we are interested in knowing which are the best colleges, the best graduate programs in economics. And those in the institutions of higher learning are also interested in knowing where they rate, less as a guide to how to do better than as a discussion topic over cocktail. (p. 8)

Since 1910, over one hundred such attempts, employing a wide range of criteria and indicators, have been recorded among which studies by Astin (1965a), Cartter (1966), Cattell (1910), Knapp and Goodrich (1952), Roose and Anderson (1970) can be mentioned. However, according to Astin (1985), traditional concepts of "excellence" used in these studies--

reputational, resources, outcome, and content approaches--have not been conclusive and have suffered major drawbacks. Gourman's ranking and evaluation reports of American colleges and universities, although widely accepted, did not have any discernable logical or scientific foundation (Coughlin, 1978; Webster, 1984). Even the most recent scheme of ranking "America's Best Colleges" by the U.S. News & World Report magazine conducted by Sheler, Toch, Morse, Heupler, and Linnon (1989) is based on the five factors of faculty, selection criteria, student retention, resources, and student placement and overlooks other major institutional components. The 1990 ranking of America's graduate schools by the same publication--based on four of these criteria--suffers from similar inadequacies ("America's Best," 1990).

These and other limited views of quality have had serious adverse effects on higher education ranging from unrealistic rating of different types of institutions (Bowen, 1974; Lawrence & Green, 1980) to problems with articulation and distribution of resources (funds) among institutions. Overall, as Astin (1985a) indicated

> they [traditional beliefs] are not necessarily consistent with the educational mission of institutions, they interfere with our efforts to expand educational opportunity, and their use does not promote greater excellence in the system as a whole. (p. ix)

Attempts to develop alternative assessment criteria are also numerous, ranging from earlier post-traditional views

reported by Rathburn (1982) to Astin's (1985) "talent development approach." These are sincere efforts; however, without an explicit and agreed-upon definition of quality to serve as the basis for a measurement instrument, advances toward solving this problem cannot be made.

Currently, the most intensive quality measurement and control activities are undertaken by accrediting agencies. Along with the local lay boards of education, accreditation has been one of the two unique features of the American educational machinery (Armstrong, 1962; Crippen, 1981; Selden, 1960). According to Brubacher and Rudy (1968), accrediting processes were initiated by leaders in education in response to a need for articulation between and quality control of diverse educational organizations that have developed in this country (Crippen, 1981).

The importance of accreditation and accrediting agencies is reflected in the history and growth of these institutions. The American pattern of accreditation, with the specific purpose of improving quality standards, emerged in 1906 (Stauffer, 1981; Young et al. 1983). The first accrediting activity occurred in 1910, and the first list of regionally accredited institutions was published by the North Central Association in 1913 (Crippen, 1981; Orlans, 1975; Selden, 1960). Today, six regional and more than 70 program accrediting agencies, operating as private entities, and a number of state and federal agencies in the public

sector (Crippen, 1981; Kaplin & Hunter, 1966) are involved with identifying and determining academic quality and encouraging institutions to maintain and enhance academic quality (Crippen, 1981).

The process of accreditation has been defined operationally in a number of ways. According to Orlans (1975), the basis of any accreditation activity must be the development of standards against which the features of a program can be compared. However, agreement upon a set of standards may be a controversial matter. The standards should reflect the consensus of the leading institutions or programs in a professional field and must be reviewed periodically with the thought in mind that changes may need to be made (Crippen, 1981). Bertrand (1974) maintained that accreditation was the process of comparing characteristics of an institution with a previously agreed-upon and approved "set of standards that provide a level of educational quality or competence as derived by a knowledgeable group of individuals sanctioned by a profession or educational agency" (Adcox, 1983, p. 1).

A review of the criteria for accreditation reflected in the Standards Handbooks of the six regional accrediting agencies revealed an extensive disparity among the definitions, criteria, standards, and foci of emphasis, verifying the shortcomings identified by Selden (1960). These weaknesses in the accreditation process were

identified as (a) an inability to evaluate quality in education, and (b) the failure to determine the relative emphasis that should be placed on different features of the evaluative process (Adcox, 1983).

The traditional theories and practices have proven to be inadequate. Meanwhile, the concern over the quality of education in this era of tremendous diversity and rapidly changing social, economic, technological, and political environment is more serious than ever before. A critical review of these beliefs and theories of excellence is necessary. "One problem is that these theories are seldom stated explicitly; rather, they are more often implicit in our actions and policies" (Astin, 1985a, p. xi).

A review of the existing literature revealed the root of the problem to be the common misconception that "quality" is an independently existing phenomenon, such as mass or volume, and that the concept known and referred to as quality exists in isolation. This belief has resulted in the formation of an inadequate theoretical basis that, in turn, has resulted in a number of inconclusive definitions of quality. Naturally, as with any ill-conceived and poorly defined phenomenon, the attempts to measure quality have proven to be futile, leading to the current state of confusion and uncertainty. A fresh systematic approach, therefore, is needed to settle the controversies over the concept, definition, and measurement of quality.

Statement of Purpose

The purpose of this study was to develop and advance a theoretical basis for defining and, subsequently, measuring quality, especially as it related to evaluation of higher education institutions for such purposes as accreditation. This theory, called the Attributive Theory of Quality, (introduced and evaluated in Chapter II) is advanced by the author to this end. To illustrate the operationalized theory, a calculation model based on the general systems theory (described in Chapter IV) supplements the study.

Assumptions

1. The numeric value generated by the model is the indicator of quality in any given system.
2. The purpose of the proposed model is to illustrate the operationalization of the Attributive Theory of Quality. In this context, the values and weights (numbers reflecting the condition and importance factor of components of a system, e.g., an institution) can be assigned intersubjectively by knowledgeable experts working at the institutions based on their perceptions of the value and importance of each component to the mission of the institution.
3. The arithmetic mean represents the intersubjectively drawn consensus figure.
4. High and low values represent the strong and weak components of the system respectively.

5. Comparison of phenomena can be carried out by assigning relative numerical values to them.
6. "Numerical terms express some of the most abstract ideas which the human mind is capable of forming" (Struik, 1967, p. 8).
7. Mathematics is not so much a body of knowledge as a special kind of language, one so perfect and abstract that--hopefully--it may be understood by intelligent creatures throughout the universe, however different their organs of sense and perception (Bergamini, 1963, p. 10).

Definition of Terms

Before further discussion of the theory and the model, a number of definitions are necessary to clarify the theoretical and application concepts of the study:

Attributes are properties of phenomena, objects, etc. (Hall & Fagen, 1968, p. 81). An attribute has its existence in a phenomenon, and does not exist in and of itself, e.g., weight of an object (Adler, 1978, p. 12).

Attributive means "of or having the nature of an attribution or attribute" (American Heritage Dictionary, 1981).

Components are the smallest meaningful units that interact with each other to fulfill the purpose(s) of the system (Silver, 1983, p. 51); e.g., print equipment or card catalogs in a library.

Condition is the degree to which a property is present in a component, e.g., number of books supporting a particular program or the number of hours a library is open (staff availability).

Phenomenon is any tangible or intangible (material or abstract) object, process, or product; anything that exists.

Subsystem is a system within the larger system. It is a set of components interrelating (within a boundary) for a purpose that relates to the purpose(s) of the larger system (Silver, 1983, p. 55). A library is a subsystem of an institution and an off-campus site is a subsystem of a library.

System is an integrated assembly of interacting elements designed to carry out cooperatively a predetermined function (Flagle, 1960); a set of objects together with relationships between the objects and between their attributes (Hall & Fagen, 1968). In this study, an institution of higher education is considered as a system (consisting of a number of subsystems and components).

Track (In the graphic depiction of system as a hierarchy) is the path of a component to the system (at the top) through subsystems.

Value indicates the condition of a component or the degree to which the property or characteristic comprising a component is present. This value is a numeric variable between 0.0 (absence of the property) and 100 (property

present at optimal level) and can be assigned intersubjectively by experts.

Weight is the contribution factor (the worth or importance) of a subsystem (in percentage figure) to its immediate system at the next level of hierarchy which in turn can be a subsystem of another system, e.g., the importance (contribution factor) of the staff subsystem to library as compared with the institutional relationship or services subsystems. The concept of weight in the context of this study is used differently from the ones used in other areas.

Theories and Model

According to Adler (1978), distinguishing between a phenomenon and its attributes dates back to the time of Aristotle who divided the physical world into bodies and attributes. An attribute belongs to a body and has its existence in it, but not in and of itself. Attributes of phenomena, unlike phenomena themselves, are not changeable, though they represent the changes in the phenomena. In other words, a change in an attribute, such as quality, is only possible by changes in the phenomenon to which it belongs. In addition to the basic physical attributes, a phenomenon has other attributes including its "relationships with other things, the actions it performs, the results of its being acted on, the time of its coming into existence,

the duration of its existence, and the time of its ceasing to exist" (p. 14).

The proposed Attributive Theory of Quality (further discussed in Chapter II) provides the theoretical basis for understanding the concept and formulating a conclusive definition for quality, especially as it relates to the evaluation of higher education institutions. This theory postulates that quality does not exist as an independent entity or phenomenon; that is, it cannot be perceived in isolation; rather, it only exists in relation to the phenomenon to which it is attributed. Similar to attributes such as weight or size, quality is only identifiable when it is considered in relation to an object. As such, it can be defined and measured as the interactive sum of all the necessary and sufficient properties that comprise the phenomenon. Specifically, to determine the presence and measure the degree, or the quantity, of quality of any phenomenon (considered a system within the context of the Attributive Theory of Quality), the components of the phenomenon, e.g., an institution of higher education, must be identified; and then, the values and weights of the components (and the subsystems formed by them) must be established so that the interactive sum of all the subsystems can be obtained to indicate the quality of the system.

According to the Attributive Theory of Quality, any phenomenon is a system, therefore, the general systems theory is used as the theoretical/methodological basis for constructing a measurement model which will illustrate the operationalization of the proposed theory. Boulding (1968) describes the general systems theory as

> a level of theoretical model-building which lies somewhere between the highly generalized constructions of pure mathematics and the specific theories of the specialized disciplines. Mathematics attempts to organize highly general relationships into a coherent system, a system however which does not have any necessary connections with the "real" world around us. It studies all thinkable relationships abstracted from any concrete situation or body of empirical knowledge. (p. 3)

At an operational level, systems approach can be used as a methodology to place an abstract concept and entity into a practical framework. In this context, according to Kimbrough and Nunnery (1983),

> systems theory is not a set of assumptions from which empirical laws can be derived by logico-mathematical procedures; it does not constitute a universal, all-inclusive, substantive body of thought. In fact, some scholars have suggested it is not even a "theory," but a methodology, and one that is empirical and interdisciplinary. (p. 320)

Whether a theory or a methodology, the systems approach to understanding the world and acquiring knowledge about any phenomenon is preferred, because this approach is

> a way of thinking and of seeing the world . . . stressing the idea of logical, thorough, and methodical thinking. The systems philosophy becomes a way to relate complex ideas, principles, and laws so that they become meaningful. (Johnson et al., 1976, p. 63)

The model presented in this study was constructed so as "to depict a physically possible, albeit idealized, reality whose existence would naturally manifest itself in the laws requiring explanation" (Dilworth, 1986, p. 155).

Although such a model, with its illustrative function, can satisfy the requirements of both theories, the dispute over the objectivity or subjectivity of the data and results will be present and must be resolved. As stated earlier in this chapter, quality has generally been perceived as a subjective judgment by an individual (Lawrence & Green, 1980), and "objective" measurement of "subjectivity" has long been a source of dispute. Extensive literature on subjectivity and objectivity has been generated by the philosophers and philosophers of science from as far back as Socrates, Plato, and Aristotle (Feyerbend, 1981).

Emphasis on objectivity gained strength in the early decades of the twentieth century and dominated science in general, and the evaluation and measurement in education and other social sciences in particular. This dominance and perceived preference, however, has been seriously questioned during the past two decades,

> a person's subjectivity, in the descriptive, unabusive sense which I favour, is the tissue of his or her knowledge, opinions, emotions, feelings, and tastes, which yields the flavour, the style, the personalness of his or her approach to things. . . . With some banality, but little prejudice, we can speak of a "point of view" and say that objectivity is possible only within a point of view and is thus a quality of one's subjectivity. (Deutscher, 1983, p. 41)

With this considerable shift in direction, another concept, intersubjectivity, advocated by the philosophers of science has been increasingly gaining momentum. Intersubjective is defined as

> used and understood by, or valid for different subjects. Especially, language, concepts, knowledge, confirmability. The character of science is especially emphasized by scientific empiricism. (Runes, 1984)

D'Espagnat (1983) further describes this approach to development of science,

> for Niels Bohr, a statement is objective as soon as it is valid for any observer. Thus, for such scientists . . . a statement or a definition that makes reference, even in an essential way, to the concept of human observer can very well be objective: it suffices that it be invariant with respect to a change of observers. Let me call objectivity defined this way weak objectivity. It differs from subjectivity fundamentally through this invariance. It could also be called "intersubjectivity." Even a die-hard realist could not deny that weak objectivity is sufficient for development of science, at least so long as it refrains from any claim of describing what lies beyond human experience. (p. 58)

This is to say that despite some of the perceived weaknesses, for research in education as a social science, the intersubjective approach has more applicability than other commonly used methods,

> admittedly, intersubjectivity is a rough approximation of the topic of these explorations, since the term prejudges the intended theme as a relationship between individuals. . . . The advantage of intersubjectivity is its customary usage; cautiously employed, the term serves as a handy launching-pad for excursion into less familiar terrain. (Dallmayr, 1981, p. 40)

This study, therefore, adopts an intersubjective approach to data collection and analysis, which in turn necessitates adopting a qualitative research methodology.

> Depending on the developmental stage of the research effort, this approach can both enhance understanding and help verify findings. . . . The intersubjective approach is usually intended to lead to a final product that all can agree represents a valid description and analysis of a situation. (Firestone, 1988, p. 210)

As for the reliability and validity of the methodology and the findings of the study, it should be noted that

> if there did exist a "scientific method" which scientists wield, the only purpose of intersubjective testing would be to assure that human frailty does not interfere with its operation; intersubjective testability would not be a logically necessary part of research. But for our approach, which requires that proposals be evaluated and accepted by the community of qualified scientists before they can become a part of science, intersubjective testing is crucial. (Brown, 1977, p. 154)

Significance

The principal contribution of this study, the Attributive Theory of Quality, is that it provides a solid conceptual and operational basis for defining quality as attributed to higher education, and further, by utilizing the general systems theory, adds a secondary contribution in form of a quality measurement model. The theoretical and methodological bases of the study clarify the confusion that has historically prevailed around this concept. The underlying theory, the Attributive Theory of Quality, regards quality as an attribute rather than an independent

entity, thus ending the futile labor of those who try to define a non-entity. This concept of quality is then placed in the context of the general systems theory to make its quantitative measurement possible.

The postulates of the proposed theory settle some of the most important disputes over the concept of quality as it relates to education in general and higher education in particular. First, by asserting that the quality of a phenomenon, such as an institution of higher education, is the interactive sum of all of its "necessary and sufficient" properties of that phenomenon, e.g., all of the components needed for an institution to fulfill its missions; it establishes that the quality of each phenomenon should be (a) measured only in relation to itself, and (b) only based on the elements/factors that are directly contribute to the fulfillment of its mission. As such, the proposed theory puts to rest such unsuccessful "quality indicator" concepts as reputational (based on comparison), and resources, outcome, and content (based on single components). Also, since the evaluation of the institutions will be based on the necessary and sufficient properties, excessive resources which do not serve the educational goals of the institution (financial investments, for example) will be excluded from consideration. Additionally, the proposed theory limits the comparison between institutions to those belonging to the same class (community colleges vis-a-vis four-year

universities vis-a-vis research universities), limiting the inequities in resource distribution caused by fallacious comparisons of the non-comparables.

This systematic approach to evaluation also drastically improves the effectiveness of accreditation processes and practices. The application of the system theory requires the identification of all the subsystems and components of an entity and precludes the omission of any part, however insignificant, from the evaluation process, thus ensuring the comprehensiveness of the assessments and self-studies. Moreover, by including both the weight (the importance/ contribution factor) and the value (indicator of the condition) of the component, this approach provides a more accurate account of the real value of each component, while demonstrating the strong and weak points of a system as they affect its overall quality. Decision-makers can evaluate factors such as cost, manpower, implementation time, etc., against the relative weight (importance) of each subsystem to determine its overall effect on the system. With this information, they can identify the improvement actions which will result in a higher yield in the overall quality of the system and allocate their resources accordingly.

This study also provides several major leads for further investigation and, consequently, adds considerably to the existing body of research. Classifying the institutions and identifying their subsystems, defining the

parameters and methodologies for assigning weights and values, and methods of evaluating decisions are some of the areas of research, the results of which can contribute vastly to the current body of knowledge. Finally, faced with the persistent anomalies of the past and absence of any discernable paradigm (Kuhn, 1973), this study provides the first such paradigm.

Organization of the Study

This study is organized in six chapters. Following the Introduction, Chapter II is fully allocated to the introduction and evaluation of the Attributive Theory of Quality. Chapter III, the review of the related literature covers the literature on quality and quality measurement, accreditation, systems theory and systems approach, and objectivity, subjectivity and intersubjectivity. In Chapter IV, the methodology, data collection and analysis, and the model for illustrating the operationalization of the Attributive Theory of Quality are presented. Chapter V presents the findings, and Chapter VI contains a summary, the conclusion, and the recommendations for further studies. Practical implications for the agencies and individuals involved in evaluative processes are also addressed here.

CHAPTER II
THE ATTRIBUTIVE THEORY OF QUALITY: INTRODUCTION & EVALUATION

> We must begin with the mistake and find out the truth in it.
> That is, we must uncover the source of the error; otherwise hearing what is true won't help us.
> It cannot penetrate when something is taking its place.
>
> Wittgenstein
> (Nersessian, 1984, p. 1)

"There is nothing more practical than a good theory."
(Kerlinger, 1964, p. 12)

Theories are generated to "impose order on naturally unordered experiences by providing systematic ways of viewing a basically chaotic world" (Fawcett & Downs, 1986, p. 2) and to assist in understanding, explaining, predicting, and controlling natural events (Kerlinger, 1964). In simple terms, through theories people seek to depict the what, why, and how of a phenomenon. A theory is, therefore, an abstract representation of reality as we perceive it.

> Theory is the culmination of a highly abstract thought process whereby ideas are removed in successive stages from the world of immediate experience. Nevertheless, because of the logic of the thought process and the indirect linkage of constructs to concepts, theories are of profound significance for understanding the experienced world. (Silver, 1983, p. 6)

The Attributive Theory of Quality was formulated as a response to the prevailing state of confusion over the concept of quality and quality measurement. A review of the related literature (Chapter III) revealed the absence of any solid theoretical bases or any constitutive or operational definitions for quality. The author's contention is that the lack of a theoretical framework has been the primary cause of chaos since concepts, definitions, propositions, and abstractions are embedded in theories.

The Attributive Theory of Quality proposed in this study has the potential to provide a solid theoretical basis for formulating a conclusive definition for quality. This theory postulates that quality does not exist as an independent entity or concept, that is, perceived in isolation. Rather, it only exists in relation to the phenomenon to which it is attributed and as such, can be defined and measured as the interactive (composite) sum of all the necessary and sufficient properties that comprise the phenomenon. At this stage, an evaluation of this theory based on the criteria represented in the literature is deemed necessary. First, however, a review of theory in general seems appropriate.

Definitions and Types

Definitions of theory are numerous, recurrent, and varied in the current literature on theory and research. These definitions range from general to specific and from

loose to restrictive. Some of the better known definitions of theory include

> a set of logically interrelated propositions . . . . an integrated set of propositional statements, each of which is an integration of constructs representing clusters of concepts pertinent to the world of human experience. (Silver, 1983, p. 6)

> a set of interconnected propositions that have the same referent--the subject of the theory. . . (Argyris & Schon, 1974, p. 4)

> a conceptualization--an orientation toward or perspective on phenomena [which] forms the basis for [the] written or formal theory. (Reynolds, 1971, p. 21)

> [according to Einstein] a continuous process that is followed in an effort to develop an increasingly simple and valid picture of reality. The definition is also very broad; any abstraction developed to understand "what is" can be called a theory. (Kimbrough & Nunnery, 1983 p. 240)

> a theory is a set of interrelated constructs (concepts), definitions, and propositions that present a systematic view of phenomena by specifying relations among variables, with the purpose of explaining and predicting the phenomena . . . . If by using the theory we are able to predict successfully, then the theory is confirmed and this is enough. (Kerlinger, 1964, p. 11)

> a theory is a provisional explanatory proposition, or set of propositions, concerning some natural phenomena and consisting of symbolic representations of (1) the observed relationships among (measured) events, (2) the mechanisms or structures presumed to underlie such relationships, or (3) inferred relationships and underlying mechanisms intended to account for observed data in the absence of any direct empirical manifestation of the relationships. (Marx, 1976, p. 237)

> a theory consists of a set of related assumptions concerning the relevant empirical phenomena, and empirical definitions to permit the user to move from the abstract theory to empirical observation. (Hall & Lindzey, 1978, p. 15)

The Attributive Theory of Quality can be placed within the parameters of any of these definitions.

As stated, the proposed theory was formulated after extensive research in literature failed to produce a solid theoretical framework for definition and measurement of quality. The search in literature was essential, because theory and research are the two components of the scientific process. Brown (1977) considered their relationship a dialectic, a transaction whereby theory determines what data are needed and research results provide challenges to accepted theories. According to Fawcett & Downs (1986), theory development relies on research and research needs theory as its guide. They further added that research

> is neither more nor less than the vehicle for theory development. It is the method used to gather the data needed for the theory. This is true whether the purpose of the research is to generate a theory or test one. When the purpose is theory generation, the phenomenon of interest suggests things to look for. . . . Conversely, if the purpose is theory testing, the theory dictates the data to be collected. (p. 4)

A number of classifications for theories in relation to research have been presented (Diers, 1979; Payton, 1979; Stevens, 1984). A classification by Fawcett & Downs (1986) will be referred to in this study.

Descriptive theory (with descriptive research)

Considered the most basic type, descriptive theories, which describe or classify specific dimensions or characteristics of a phenomenon, are needed "when nothing or

very little is known about the phenomenon in question. They state "what is" (Fawcett & Downs, 1986, p. 4). Stevens (1984) classified descriptive theories into (a) naming theories which describe the dimensions or characteristics of some phenomenon, and (b) classification theories, frequently referred to as typologies or taxonomies, which are more elaborate in that they describe the structural interrelationship of the dimensions or characteristics of a phenomenon. "The dimensions may be mutually exclusive, overlapping, hierarchial, or sequential" (Fawcett & Downs, 1986, p. 5).

Descriptive (exploratory) research is used to generate and test descriptive theories. This type of research is directed toward answering questions such as "what is this?" (Diers, 1979, p. 103), and "what are the existing characteristics of the real world relative to the specific question" (Payton, 1979, p. 44)? Nonempirical methods such as philosophical (describing the phenomenon through critical discussion) and historical (description of phenomena that occurred at an earlier time) inquires may be used in this type of research.

Explanatory theory (with correlational research)

Explanatory theories specify relations between dimensions or characteristics of a phenomenon by explaining how the parts of a phenomenon are related to one another. These theories can be developed by correlational research

only after descriptive theories have been developed and validated and seek to answer such questions as "what is happening here?" (Diers, 1979, p. 125), and "to what extent do two (or more) characteristics tend to occur together" (Payton, 1979, p. 44)? Correlational studies use the empirical method which requires measurement of the dimensions or characteristics of phenomena in their natural states (Fawcett & Downs, 1986).

Predictive theory (with experimental research)

By addressing the causation or the "why" of change in a phenomenon, predictive theories seek to predict the precise relationships between dimensions or characteristics of a phenomenon or differences between groups. This type of theory may be developed after explanatory theories have been formulated and are generated and tested by experimental research. Predictive theories ask questions such as "what will happen if . . . ?" (Diers, 1979, p. 145), and "is treatment A different from treatment B" (Payton, 1979, p. 45)? Experimental research uses the empirical method of experimentation which involves the manipulation of some phenomenon to determine its effect on some dimension or characteristic of another phenomenon (Fawcett & Downs, 1986).

As a descriptive theory, the Attributive Theory of Quality can be further strengthened through exploratory research that might reveal the need for further expansion of

the theory to explanatory and eventually predictive types. Two other aspects, i.e., theory formalization and evaluation, should be addressed in relation to the proposed theory. However, in order to avoid redundancy, a point-to-point reference to the Attributive Theory of Quality will not be made. Instead, the rest of this section should be viewed with the Attributive Theory of Quality in mind. An evaluation checklist will conclude this section.

Theory Formalization

Briefly stated, theories are made up of one or more concepts, the definitions of those concepts, and the propositions that state something about the concepts. Several forms of theories are evident in research reports. For example, in theory-generating studies, the theory frequently is presented in the form of one or more newly discovered concepts, the dimensions of the concept(s), and relevant propositions. Regardless of the form, however, theories are rarely presented as explicit sets of concepts, definitions, and propositions; but rather as "untidy and inelegant narratives" (Marx, 1976, p. 235), which must be analyzed systematically so that their concepts, definitions, and propositions can be identified. This process is accomplished by theory formalization, also called theoretical substraction. It is used to understand a theory and to extract an explicit statement and a diagram of a theory from its verbal explanation,

> theory formalization may even involve the translation of a verbal theory into a mathematical or computer language. This means that symbols are substituted for concepts, and equations, for propositions. The result of theory formalization is a concise and polished version of the theory that sets forth its components clearly, concisely, pictorially, and if desired, symbolically. (Fawcett & Downs, 1986, p. 15)

Concepts

The first step in theory formalization is the identification of its major concepts. Fawcett and Downs (1986) defined a concept as the description of an abstract idea or mental image of some phenomenon. They added that a concept summarized the related observations and experiences and referred to the properties of a phenomenon, not to the phenomenon itself. Concepts "give meaning to sense perceptions and enable us to categorize, interpret, and structure the phenomenon" (p. 16), and make up the vocabulary of a theory.

> Although the observations and experiences are real, our concepts are only mental creations. The terms associated with concepts are merely devices created for filing and communication. . . . Ultimately, [the concept] is only a collection of letters and has no intrinsic meaning (Babbie, 1983, p. 107).

Definitions

According to Fawcett and Downs (1986), identification of the definitions of the concepts used in theory is the second step in theory formalization. As the basic building blocks of theories, concepts must be precisely and

accurately defined so that the meaning of one concept may be distinguished from the meaning of another.

To make the concepts of a theory empirically testable, two types of definitions are needed. The constitutive definition (also called a theoretical, a nominal, or a rational definition) defines a concept with other concepts and provides it with theoretical meaning, that is, what the concept is. The operational definition, also known as epistemic or real definition, provides the concept with empirical meaning by defining it in terms of observable data. Operational definitions (which are needed regardless of type of research) are measurement-oriented interpretations of constitutive definitions (Fawcett & Downs, 1986). Kerlinger (1964) identified two classes of operational definitions: The measured operational definition stating how a concept will be measured, and the experimental operational definition showing the details of operations required to manipulate the concept.

Propositions

A proposition is a declarative statement about a concept or the relation between concepts. Specifying relational or nonrelational propositions is the third step in theory formalization. Relational propositions link two or more concepts by stating that changes in one variable is systematically accompanied by changes in another variable. Nonrelational propositions either state the existence of a

concept or define it. The former assert the existence or level of existence of a phenomenon, and the latter describe its characteristics. Constitutive and operational definitions actually are definitional propositions (Fawcett & Downs, 1986).

Hierarchies of propositions

Hierarchical ordering of the propositions according to their levels of abstraction, on a continuum from abstract to concrete or from concrete to abstract, is the fourth step in theory formalization. The abstract propositions are concerned with more general phenomena or a wider class of objects than are the concrete propositions, which are concerned with more specific phenomena or a narrower class of objects. Gibson (1960) referred to abstract statements as unrestricted propositions and to concrete statements as restricted propositions and noted that the distinction resulted from the limits of space and time within which the proposition was applied (Fawcett & Downs, 1986).

Diagrams

Construction of a diagram of the theory is the final step in theory formalization. A diagram helps to determine how all concepts, definitions, and propositions of the theory were brought together. It is the final aid to understanding exactly what the theory says and what it does not say. It also facilitates the identification of gaps and overlapping ideas in the theory (Fawcett & Downs, 1986).

Criteria for Evaluation of Theory

Criteria for the evaluation of theory can be found in the literature of almost every discipline. The current literature reflected an overall agreement on four criteria for evaluation of a theory. These criteria, as presented by Fawcett & Downs (1983), included significance, internal consistency, parsimony, and testability. An evaluation of the Attributive Theory of Quality will be conducted against these criteria.

Significance of a theory

According to Fawcett & Downs (1983), the basic premise of this criteria is that a theory should address a phenomena of interest to a discipline, as well as providing both precision in prediction and explanatory power. Precision, they elaborated, referred to the ability of a theory to make accurate prediction about a phenomenon--its occurrence, its relationship to another phenomenon, etc., in objective terms that may be expressed in mathematical equations. "A theory that provides a good explanation of some phenomenon can be said to rate highly on explanatory power because it produces a feeling of understanding in those who study it" (Goodson & Morgan, 1976, p. 297). Both precision and explanatory powers are needed because no matter how precise the statement about concepts might be, the concepts are neither meaningful nor significant unless they are understood. Although, according to Dubin (1978) it is possible for a

theory to achieve high precision in prediction without explaining how the predicted outcome was achieved (precision paradox), and conversely, it is also possible for a theory to achieve high explanatory power without the concomitant ability to predict precise outcomes (power paradox). It should be noted that theories with high precision tend to be narrow in scope; and those with high explanatory power, broad in scope. Either case is problematic. Theories must therefore be somewhat general and complex, yet encompass a small number of well-defined concepts. These are referred to as "theories of the middle range" (Fawcett & Downs, 1986, p. 55).

Internal consistency of a theory

This criterion requires concepts to reflect semantic clarity and consistency. In an internally consistent theory, concepts are clearly defined and the same definitions are used throughout the theory. Semantic clarity and consistency are related in such a way that one without the other is useless (Chinn & Jacobs, 1983). Internal consistency also requires that concepts should not be redundant and that propositions reflect structural consistency, that is, logical relationships. Flaws in the logical structure of a theory can result in incomplete (discontinued) sets of propositions which occur when some propositions are not explicit (Fawcett & Downs, 1986).

Parsimony of a theory

Parsimony requires a theory to use as few concepts, definitions, and propositions as possible to describe, explain, or predict a phenomenon. Marx (1976) claimed that parsimony had both historic and logical bases,

> Historically, scientists have learned that the more [theoretical statements] that are involved--or the more complex a theory is--the greater likelihood there is of error. . . . Logically, the reason for the greater effectiveness of the simple solution is, in large part, that science mainly consists of a more or less feeble groping toward "truth," or factualness, and that most of our original ideas are doomed to extinction. On a probability basis alone, therefore, the fewer the links in the chain, the less likelihood of serious error. (p. 251)

False parsimony occurs because of oversimplification of the phenomenon or when the theory does not capture the essential features of a phenomenon. A theory, therefore, should be evaluated to determine "whether the most parsimonious statement clarifies rather than obscures the phenomenon, and whether it effectively deals with all the data about the phenomenon" (Fawcett & Downs, 1986, p. 59).

Testability of a theory

The basic requisite of a useful theory is generally considered its testability. Marx (1976) maintained that if "there is no way of testing a theory, it is scientifically worthless, no matter how plausible, imaginative, or innovative it may be" (p. 249). However, the views on testability differ. There is a strict view that considers a theory testable only if its concepts can be observed

FIGURE 1. Criteria Checklist for Evaluation of Theory

Is the theory that was generated or tested SIGNIFICANT?

_Y_ Does the theory address a phenomenon of interest to the discipline?
_Y_ Does the theory improve the precision with which a phenomenon can be predicted as well as the understanding of the phenomenon?

Is the theory INTERNALLY CONSISTENT? (To be tested)

___ Do the concepts reflect semantic clarity and consistency?
___ Are concepts redundant?
___ Do the propositions reflect structural consistency?
___ Are there incomplete or redundant sets of propositions?
___ Do the observations [research results] substantiate the conclusions of an inductively developed theory?
___ Are the premises of a deductively developed theory valid?

Is the theory PARSIMONIOUS? (To be tested)

___ Is the theory stated clearly and concisely?

Is the theory TESTABLE?

_Y_ Can the concepts be empirically observed?
_Y_ Can the propositions be measured?
N/A Can the derived hypotheses be falsified?

Adapted from Fawcett & Downs, 1986, p. 69.

empirically, if its propositions can be measured, and if its derived hypotheses can be falsified. Another view maintains that testability does not have to be direct and yet another that theories should be potentially testable. Finally, one view holds that theories should be testable through imaginary or thought experiments rather than by empirical means. Empirical testability is not, of course, an appropriate criterion for theories developed by nonempirical methods such as philosophic inquiry and historic research. Rather, these methods include their own rules for theory testing (Fawcett & Downs, 1986)

To conclude this section, the Attributive Theory of Quality will be measured against the criteria listed in a checklist (Figure 1) adopted from Fawcett & Downs (1986). It should, however, be noted that because of the limitation of this study, that is, the absence of empirical data, the proposed theory could not be evaluated against the two criteria of internal consistency and parsimony within the scope of this study.

CHAPTER III
REVIEW OF RELATED LITERATURE

"It is a capital mistake to theorize before one has data."
Sir Arthur Conan Doyle 1859-1930
The Adventures of Sherlock Holmes

Introduction

An extensive systematic search for literature on quality and quality measurement in general and in the education sector was conducted. Initially, a computer-assisted search was conducted in three general but distinct areas, (a) quality and evaluation, (b) accreditation, and (c) the general systems and decision theories. To guide the search, various relevant descriptors including the following were used: quality; excellence; quality measurement; evaluation (-criteria, -methods, program-, formative-, summative-, etc.); assessment; accountability; effectiveness (program-, organizational-, etc.); accreditation; systems theory; systems approach; decision theory; decision-making; quantitative analysis; planning models; mathematical models; etc. Later, another detailed search for literature on objectivity, subjectivity and intersubjectivity in philosophy, science, and research was also conducted.

The review of the gleaned materials demonstrated the need for substantial refinement and narrowing of the titles

in the first two areas. The outcome was a considerable amount of literature that dealt more specifically with accreditation, assessment and evaluation as related to quality and quality measurement. Also, included in this category was literature on institutional rankings as earlier forms of quality indicators.

The literature on accreditation was equally inconclusive in relation to the questions of quality and quality measurement. Most of the material covered the history and processes of accreditation (Armstrong, 1962; Orlans, 1975; Selden, 1960; etc.), and even the review of the Handbooks of the Accreditation published by the six regional accreditation agencies (MSACS, 1982; NCACS, 1988; NEASC, 1983; NWASC, 1988; SACS, 1988; WASC, 1988) had no acceptable definitions for quality, although the term, along with its perceived synonyms such as excellence and effectiveness, was repeatedly used.

The literature on the general systems theory and its applications was available, but the search for materials dealing with the decision theory and decision tree Analysis resulted in identifying a limited number of journal articles. Even the attempts for finding leads for more material through examination of the references provided in each work failed because the articles mostly cross-referred to each other. Nevertheless, five of these articles provided some basic (although business-specific) information

on the subject, and were initially deemed relevant to this study (Brown, 1970; Hammond, 1967; Magee, 1964a; Magee, 1964b; and Ulvila & Brown, 1982). Further analysis, however, proved these articles to be inappropriate for this study, and they were consequently omitted.

Subjectivity and objectivity in perception and measurement were recurrent themes in the literature. The debate between the proponents of objectivity and subjectivity has a long history, with each side assigning more validity and creditability to their approach, leaving the main question unanswered. The review of this literature did, however, suggest a relatively new approach to perception and measurement of such concepts as quality, namely, the intersubjective approach (Brown, 1977; Dallmayr, 1981; d'Espagnat, 1983; Firestone, 1988; etc.). The intersubjective approach has proven to be more appropriate for this study and was, therefore, adopted as the research methodology.

The main body of the review will, therefore, include three parts: quality and quality measurement (covering institutional rankings and accreditation); the general systems theory; and, finally, objectivity, subjectivity, and intersubjectivity. The review of the literature related to theory construction and testing has been presented in chapter II.

Quality and Quality Measurement

The ubiquitous and elusive concept of quality has preoccupied people throughout history, and attempts to capture the concept of quality have resulted in a wide range of interpretations from philosophical discourses to operational definitions. The outcome of these efforts has been a common understanding that quality is a subjective concept and as such does not lend itself to accurate definition or measurement.

Attempts to define quality are not uncommon. Juran (1988) contended that the word quality has multiple meanings, and that two of those meanings dominate the use of the word, "(a) quality consists of those product features which meet the needs of customers and thereby provide product satisfaction, and (b) quality consists of freedom from deficiencies" (p. 2.2). Cartter (1966) defined it as "someone's subjective assessment" (p. 4), and Roose and Anderson (1970) labelled it as "an amorphous attribute" (p. xi). Measuring quality has been equally difficult, "But quality assessment, whether academic or procedural, is inherently difficult. There are no agreed-upon, defined standards for measurement, let alone methods for improving them" (Stauffer, 1981, p. 2).

To illustrate the prevalent frustration and confusion over the concept, definition, and measurement of quality the following outcry by Pirsig (1975) is often quoted,

> quality . . . you know what it is, yet you don't know what it is. But that's self-contradictory. But some things are better than others, that is, they have more quality. But when you try to say what the quality is, apart from the things that have it, it all goes poof! There's nothing to talk about. But if you can't say what quality is, how do you know that it even exists? If no one knows what it is, then for all practical purposes it doesn't exist at all. But for all practical purposes it does exist. What else are the grades based on? Why else would people pay fortunes for some things and throw others in the trash pile? Obviously some things are better than others...but what's the 'betterness'. . . So round and round you go, spinning mental wheels and nowhere finding anyplace to get traction. What the hell is Quality? What is it (p. 184)?

Quality measurement and improvement have been among the most enduring issues in higher education. According to Solmon (1981), the implications of quality in higher education have been excellence, accomplishment, and being distinguished. He, however, considered the three concepts quite different. Being distinguished could reflect the difference between leading or innovative institutions and those that were not. Accomplishment referred to goal achievement by the institutions which affected various participants in the educational process. The concept of excellence probably has come closest to "connoting what is usually viewed as quality in higher education--a consensus that an institution or a program is superior. Once again the unresolved question is, how is this superiority measured, that is, superiority along what dimensions? And superiority compared to what" (p. 6)? Of course, the other extreme in the assessment of institutional or program

quality seems to have developed from the American interest in excellence per se and in competition (Clark, 1976).

Institutional ranking and accreditation have been the two most common methods of defining and measuring the quality of the institutions of higher education in America. Ranking, particularly reputational ranking, has received widespread acceptance through decades. Since 1910, over one hundred such attempts employing a wide range of criteria and indicators have been recorded. Most of these rankings have dealt with graduate programs and only a few address the undergraduate schools. Several reviews and critiques of these studies have been conducted (Dolan, 1976; Lawrence & Green, 1980; Webster, 1981; Rathburn, 1982; etc.). Therefore, to avoid needless repetition, this part of the review will first give a brief chronological account of the most notable of these rankings, and then will present an overall critique of the ranking schemes and their criteria and indicators.

Institutional Ranking

In 1910, James McKeen Cattell devised the first academic quality ranking (Webster, 1986a). In the same year, Abraham Flexner's report, "Medical Education in the United States and Canada" forced the low quality [smaller?] medical schools out of business (Stauffer, 1981). More than a decade later, in 1924, Raymond M. Hughes conducted the first studies for the Association of American Colleges,

which incidentally was created in 1900 in response to the need to certify to European universities which American institutions educated students at quality levels meriting admission to their doctoral programs. Hughes's primary reason for this work was his interest in offering his students some guidance in choosing appropriate graduate schools. Based on this study, Hughes published the first reputational ranking of graduate programs in 1925. He replicated this study for the American Council on Education (ACE) in 1934 (Stauffer, 1981).

The 1924 and 1934 studies by Hughes remained in force for almost two decades until Knapp and Goodrich (1952) published their controversial report which showed that few of the nation's most highly regarded universities excelled in producing male scientists. Knapp and Goodrich argued that the reason some institutions excelled in the production of scientists was because they had excellent faculty members and curricula in science.

The next major study, however, was not conducted until 1959. This study was conducted by Hayward Keniston as a part of an educational survey of the University of Pennsylvania. Whereas Hughes had used the number of prominent scholars in each school as the only criterion in his 1925 study and the quality of facilities and staff of the doctoral program for the 1934 report, Keniston based his evaluation on the quality of doctoral programs and the

faculty (Rathburn, 1982). Keniston asked department chairmen in 25 leading universities to list, preferably in rank order, the 15 strongest departments in their fields at the 25 institutions. He calculated scores for each department by assigning a weight inversely to the rank orders--a department listed first would receive 15 and the one listed fifteenth, would be weighted 1. The total of the weighted ranking would then determine the rank of the department. Lists of the top 20 or so departments in the 24 disciplines were published in 1959 as an appendix to a study of graduate education at the University of Pennsylvania (Roose & Anderson, 1970, p. 1). This study was later used to generate the list of the top 20 institutions.

In the same year, Chesly Manly published the first ranking of undergraduate colleges for the Chicago Tribune. The basis of the ranking was the reputation of the institutions among the higher education experts and objective data when there was no clearly defined consensus among his experts (Webster, 1986b). Lazarsfeld and Thielens, Jr. (1958) grouped the 165 institutions at which the social scientists they studied were employed into eight levels of quality (although they did not publish the list of which schools fell into which group). They used the number of library volumes as the criterion.

During the 1960s and early 1970s, the rating game gained momentum. In 1960 Ousiew & Castetter correlated the

amount of money spent at the institutions as the objective quantifiable measure with the established rankings of institutional quality, and in 1963, Pike conducted a study of Texas community colleges based on current expenditure, enrollment, and expenditure per student (Rathburn, 1982). In 1963, Jordan divided 119 colleges and universities into five strata according to the quality of their undergraduate education based on the library volumes per student and library staff salaries (measure associated with graduate schools). In 1964, the American Council on Education developed a six-level stratification of 767 liberal arts colleges which included all predominantly undergraduate four-year colleges and universities, although this classification was apparently never published. The "quality per student" criterion was used by Brown in 1965 (Webster, 1986b, p. 39).

By this time, new criteria and indicators were being considered. Astin (1965b) listed the 25 highest-ranking colleges and universities by their "estimated selectivity," in 1961-1963. This criterion was based on the selection of the institutions (first or second choice) by the juniors who were taking the National Merit Scholarship Qualifying Test.

One of the most notable studies of this type was the 1966 ranking of the doctoral programs (departments) by Allan Cartter. Besides ranking, Cartter's aim was to correct the flaws in studies conducted by Hughes and Keniston.

According to Rathburn (1982), lack of control for geographical bias and raters' biases toward their alma mater, failure to distinguish measures of faculty quality from measures of educational quality, and using the department chairpersons were considered as the more important flaws.

Cartter's 1964 survey included 4,000 faculty members in 30 disciplines at 106 major institutions who were asked to select from a number of descriptors the one that best suited (a) the quality of the graduate faculty, (b) the effectiveness of the doctoral program, and (c) the degree of expected change in the relative position of departments in any of the major institutions that offered doctoral study in the rater's discipline. To each term describing the quality of faculty and the effectiveness of the program, Cartter assigned a numerical weight which he used to calculate the average scores for each question for each department at each institution. The score of the most important factor, the quality of graduate faculty scores, could range from a high of 5.00 (rated as "Distinguished") to a 0.0 (considered to be of a quality "not sufficient to provide acceptable doctoral training"). The "Distinguished" departments, those with scores of 4.01 and higher, and the "Strong" ones (scoring 3.01-4.00) were listed in rank order. The departments labelled as "Good" (2.51-3.00) and "Adequate plus" (2.00-2.50) were listed alphabetically. These

results, together with an extensive discussion of the relationship of the scores to other factors that were assumed to contribute to high-quality graduate education, were published in 1966 (Roose, 1970). Despite the apparent validity of the results of Cartter's study (high correlation with a number of measures such as faculty salaries, library resources, and publication indexes), Cartter refused to produce institutional rankings by aggregating the departmental rankings. Magoun (1966), however, presented an aggregated indicator of the institutional ranking based on the data from Cartter's report by assigning additional scores to the descriptors "good", "adequate plus", and "acceptable plus", etc., (for which no scores were assigned in the report). "The ranges of ratings which differentiate clusters were upper, 4.5-4.1; upper-middle, 4.0-3.5; lower-middle, 3.4-2.4; lower 2.3-1.3. All ratings referred to the quality of graduate faculty (Magoun, 1966, p. 483).

Parenthetically, similar studies to produce program/institutional rankings were undertaken by Morgan, Kearney, and Regen, (1976), the National Science Foundation (1969); and Petrowski, Brown, and Duffy, (1973). Carpenter and Carpenter (1970), Cole and Lipton (1977), Cox and Catt (1977), Gregg and Sims (1972), Margulies and Blau (1973), and Munson and Nelson (1977) used the two ACE criteria, quality of graduate faculty and effectiveness of the doctoral program (Rathburn, 1982).

The most significant study after Cartter's 1966 report was conducted by Roose and Anderson (1970) for ACE. Although this report presented "a range of raters" scores rather than absolute raw departmental scores and spoke in terms of quality ranges instead of specific institutional rankings . . . its results were very similar to Cartter's report (Rathburn, 1982). Meanwhile, a number of other studies were published.

Abram Samuel's 1965 pamphlet, "Where the Colleges Rank" and its successive issues (1967 and 1973) were "two of the most successful attempts to rank colleges and universities by the quality of their undergraduate education" although he considered them "more of a conversation piece than anything else" (Webster, 1986b, p. 40). In his most refined edition (1973), he assigned an arbitrarily selected number out of 1,142 to the institutions, which reflected the primitive state of such rankings. In 1967, Brown conducted another study in which he introduced eight criteria (measures associated with graduate schools) for ranking. These criteria included total income per student, proportion of students entering graduate school, proportion of graduate students, number of library volumes per students, total number of full-time faculty, faculty-student ratio, proportion of faculty with doctorate, and average faculty compensation. A number of non-academic ratings began to appear in popular press and even commercial and often

unreliable versions of rankings were generated, among which the dubious Gourman's Reports (form 1967 to 1989) should be mentioned that regardless of their lacking any logical or scientific foundation (Coughlin, 1978; Webster, 1984) have received wide acceptance, even in the academe.

During this period, additional ranking criteria were also introduced. Lewis (1968) suggested publication productivity; George Pierson (1969) published a ranking of almost 100 colleges and universities according to how many leaders, in a great many fields, they had graduated. A study by Wispe (1969) used research productivity as the evaluation criterion; Krause and Krause (1970) evaluated students' success; and Walters (1970) presented 58 indicators for assessment of community colleges. Correlation of quantifiable measures to established ranking of institutional quality was also attempted. Astin (1977) suggested selectivity; Hagstorm (1971), and Elton and Rose (1972) proposed institutional size; and Drew (1975) included research productivity.

In 1978, Astin's Higher Education Research Institute of Los Angeles listed the 25 most selective institutions of higher education in the United States, and--since all of them were privately controlled--also the 25 most selective public universities, basing the lists on the 1973 freshman scores on the Scholastic Aptitude Test (SAT) and the American College Test (ACT), with ACT scores converted into

SAT-score equivalents (Astin & Solmon, 1979). To test selectivity as a criterion, they rated four-year schools by the combined SAT and ACT scores of the freshman class that entered in Fall 1976, and found it to have correlation with other characteristics such as student-faculty ratio. Later they added the institution's drawing power to this criterion (Astin & Solmon, 1979).

In their 1981 study, Solmon and Astin ranked the leading departments in seven fields of study at schools that had not been rated in the top category in these fields in the Roose/Anderson reputational ranking of Ph.D. granting departments. The fields were biology, business, chemistry, economics, English, history, and sociology. The departments were rated according to their reputation for quality according to these six criteria: the overall quality of undergraduate program, preparation of students for graduate and professional school, preparation of students for employment after college, faculty commitment to undergraduate teaching, scholarly or professional accomplishments of faculty, innovativeness of curriculum and pedagogy. Later, Solmon and Astin excluded business from their analysis because of problems with the data (Solmon & Astin, 1981).

The staff of U.S. News and World Report have been involved in quality ranking since 1983 and although they have tried to improve and validate their methodologies, the

results of their efforts, along with the other "popular press" ratings, have only received public attention. Even the 1989 version (Sheler, et al., 1989) with a seemingly scientific methodology and objective data has serious flaws. This study, besides assigning arbitrary weights and scores, bases the ranking on only five criteria of

- selectivity (the higher the caliber of the student body, the richer the educational experience in the classroom and on campus);
- reputation (a well-respected name on a diploma can open doors in the working world and at graduate schools);
- faculty (top-quality instruction depends on a low student-teacher ratio, a highly educated faculty and an ample budget);
- resources (endowment income, library budget and government funding are good measures of a school's financial fitness); and
- retention (a school's ability to see freshmen through to graduation says a lot about its commitment to students).

The authors omitted retention criterion from their 1990 ranking of America's "best" graduate schools, but the ranking, despite attempts for improved the methodology, still suffers from the same shortcomings as its predecessors (America's . . . 1990).

The two editions of the "Baccalaureate Sources of Ph.D.s" by Franklin and Marshall College which lists leading producers of Ph.D.s from among 867 "four-year, private, primarily undergraduate institutions," from 1920 to 1980 has claimed such productivity as "one important measure of quality."

Critique of Ranking

Most of these evaluative studies have been widely accepted and have had long-lasting effects on higher education, although they have been conducted infrequently (Solmon, 1981). Hughes studies, for example, evolved from a basic guide for undergraduates to "procedures for quality ratings including the identification of the nation's leading institutions through numerical ranks based upon the informal opinions of academicians" (Rathburn, 1982, p. 13). Most of these reports suffered from a number of general and specific flaws. Cartter (1966), for example, identified geographical and rater biases, failure to distinguish measures of faculty quality from measures of educational quality, the failure to account for the biases of raters toward their alma mater, and the choice of department chairs as raters in the Hughes and Keniston studies. "Normativeness is inherent in quality control and appears unlikely to diminish. Even when definitions and methodology are designed with precision, controversy ensues: attempts in the last several decades to assess the quality of graduate programs are a case in point"

(Stauffer, 1981, p. 2). He added that the methodologies, data analyses and application of the results of these evaluative reports have been subject to questions and controversies.

First, only 15 out of several hundred studies (Webster, 1986b, p. 40) addressed the undergraduate education which has been the largest segment of American higher education. Second, those that did, represented the quality of an institution or department with a number--aggregated or otherwise--and then committed the logical fallacy of comparing it with other units across the nation, whether or not they were comparable in terms of type, size, mission, etc. Third, regardless of the several different criteria and benchmarks that were employed, none of these studies considered the overall institutional system (all the input, processes, and output), thus, overlooking several major components and factors. Fourth, in these ratings, "results may be inextricably tied to the precedents set in previous reputational studies" (Solmon, 1981, p. 25). Fifth, peer review--rating by faculty as experts--has been the methodology used in most of these studies and has received most attention among academics, primarily because experts, by definition, have not been obligated to justify their selection. However, because their judgments have proven to be heavily influenced by only one factor, that is, their perceptions of the scholarly accomplishments of the faculty

in that department (Astin & Solmon, 1981), using peer judgments in determining the quality of academic institutions has been "a focus of national controversy for some time" ("Cartter," 1977, p. 44),

Other weaknesses of reputational ranking have been listed as lack of an agreed-upon definition of quality (Lawrence & Green 1980); unscientific approaches that reward large, orthodox research institutions (Solmon, 1981); failing to recognize diversity, innovation, and nontraditional models (Dolan, 1976); and rater bias. Alumni have demonstrated positive bias toward their alma mater, and raters' biases have generally displayed halo/horn effects in which an institution's standing affects a particular program positively or negatively or vice versa. Webster (1981) reported a case that clearly demonstrated this phenomenon,

> In 1980 two professors at the University of Virginia's McIntire School of Commerce published a monograph containing a list of the twelve "top-ranked undergraduate business programs" in the United States according to, among others, senior personnel executives of America's largest industrial firms, banks, and public utilities. These senior personnel executives named Harvard, Stanford, Columbia, the University of Chicago, and Northwestern as having undergraduate business schools among the nation's twelve best, unfortunately overlooking the fact that none of these institutions even has an undergraduate school of business. (p. 20)

Astin (1985b), while introducing yet another inconclusive criteria, maintained that other traditional concepts of "excellence" used in previous studies--reputational, resources, outcome, and content approaches--

have not been effective and have suffered major drawbacks.

> In the reputational view, excellence is equated with an institution's rank in the prestige pecking order, as revealed, for example, in periodic national surveys. The resources approach equates quality or excellence with such things as the test scores of entering fresh-men, the endowment, the physical plant, the scholarly productivity of the faculty, and so on. The reputation and resources approaches are, of course, mutually reinforcing. For the past few years I have been arguing that these traditional views do not serve us well, and that we should redefine excellence in terms that are more consistent with higher education's most fundamental purpose: the education of students. (p. 35)

The literature reviewed in this study provided a list of criteria for evaluation and ranking of institutions of higher education that reflected the efforts for finding an acceptable and conclusive benchmark for measuring institutional quality. Even if aggregated, these criteria would only address the system in parts, and even then, without factoring the interrelationship among them, they would not be able to produce a conclusive result. Briefly, these criteria and approaches--a number of which were reported by Fotheringham (1978)--included

- faculty per capita article publication
- faculty reputation and quality of the educational experience
- faculty eminence through scholarship--especially at the graduate level
- number of prominent scholars
- the quality of facilities and staff of the doctoral program
- quality of doctoral programs and the faculty
- the quality of the graduate faculty
- total number of full-time faculty
- faculty-student ratio
- proportion of faculty with doctorate
- average faculty compensation

- research productivity
- faculty commitment to undergraduate teaching
- scholarly or professional accomplishments of faculty
- student/faculty ratios
- faculty satisfaction and achievement
- reputation and accessibility of faculty
- quality of students
- the quality of preparation of doctoral students
- estimated selectivity
- proportion of students entering graduate school
- proportion of graduate students
- students' success
- selectivity based on freshman SAT/ACT scores
- preparation of students for graduate/professional school
- preparation of students for employment after college
- institution's popularity among high ability students
- institution's popularity among out-of state students
- being the most often selected schools by all students
- total enrollment size
- percentage of graduate students
- value added approach (outcome)
- student satisfaction
- access and retention
- prominence of the alumni
- number of leaders graduated in any field
- alumni achievements
- library resources
- library holdings
- other educational facilities
- amount of money spent
- current expenditure and expenditure per student
- library volumes per student and library staff salaries
- total income per student
- number of library volumes per students
- resources (endowment, library budget, financial fitness)
- institutional size
- sheer institutional size
- financial resources
- per student expenditures for various purposes
- curricula
- innovative programs
- the effectiveness of the doctoral program
- the degree of expected change in departments
- overall quality of undergraduate program

- innovativeness of curriculum and pedagogy
- producing Ph.D.s
- total bachelor's degrees awarded in that field
- the percentage of baccalaureates awarded in various fields
- business/industry experts' views
- reputation among higher education expert
- the top institutions as rated by Gourman 1977
- reputation (a well-respected name)
- factors contributing to an effective and professional environment
- control (private vs. public, etc.)
- geographic region
- prestige (an interaction between size and selectivity)
- goals and goal achievement
- customized measures for different institutions
- administrator satisfaction and achievements
- services provided to local and broader communities
- innovativeness and leadership
- rates of improvement in different dimensions
- views given by multiple evaluators
- quality not quantity
- institution/program contributions to the student and community
- evolution/history

Accreditation

The accreditation process was among the early efforts to deal with the issue of educational quality control and even today, the most intensive quality measurement and control activities have been undertaken by accrediting agencies. Along with the local lay boards of education, accreditation, dating as far back as 1787, has been one of the two unique features of the American educational machinery (Armstrong, 1962; Crippen, 1981; Selden, 1960). It is a non-governmental, voluntary means for regional, specialized, and other national accrediting agencies to set the characteristics, qualities, and manner in which those who seek and hold membership in the agencies are judged

(Thrash, 1979, p. 116). In 1960, Selden stated that higher education in modern society could function only with the aid of some organizational method that ensured the maintenance of academic quality (p. 86).

> It is not enough to have quality. Quality also has to be maintained and guaranteed. In higher education, QUALITY ASSURANCE is the collective term for institutional activities, policies, and procedures that provide a measure of confidence that what is done academically is consistent with the institution's goals and is likely to effect learning at levels established by the institution or by the external bodies. (Kendall, 1983, p. 74)

Accreditation has been defined conceptually, procedurally, and operationally and unlike quality, the definitions are similar. Orlans (1975) reported it as "a process of recognizing those educational institutions whose performance and integrity entitles them to the confidence of the educational community and the public" (p. 2). Bertrand (1974) considered it as evaluating an institution's characteristics such as programs or curriculum against a set of standards established by a knowledgeable group of individuals sanctioned by a profession or educational agency. Selden (1956) defined it as the process whereby an organization or agency recognizes a college or a university or a program of study as having met certain minimum predetermined qualifications or standards. The basic characteristics of accreditation, according to Selden (1956) are (a) its prevailing sense of voluntarism, (b) its strong tradition of self-regulation, (c) its reliance on evaluation

techniques, and (d) its primary concern with quality. Historically and currently, accreditation at postsecondary level has been intended to foster excellence by developing criteria and guidelines for assessing educational effectiveness; encouraging improvement; ensuring appropriateness of institutional objectives; providing counsel and assistance; encouraging diversity; and protecting against encroachment (Young, 1979, p. 216).

The importance of accreditation and accrediting agencies is reflected in their history and growth. Accreditation practices were initiated by leaders in education in response to a need for articulation among institutions and quality control of the diverse educational organizations that developed in this country (Brubaker & Rudy, 1968, p. 389). By the late nineteenth and early twentieth centuries, associations of academic leaders were being formed, the College Entrance Examination Board was founded, and conferences were held--notable was the 1906 meeting in Williamstown, Massachusetts, from which the American pattern of accreditation evolved--with the specified purpose of improving quality standards (Stauffer, 1981, p. 1). According to one account (Crippen, 1981), the first regional accrediting agency--New England Association--was established in 1885, the first accrediting activity occurred in 1910, and the first list of regionally accredited institutions was published by the North Central

Association in 1913 (Crippen, 1981; Orlans, 1975; Selden, 1960).

The main purpose of the regional agencies should be twofold--to assist in improving institutions and to indicate those that are known to be generally effective in achieving appropriate educational objectives (Kells, 1976, p. 27). Today, six regional and more than 70 program accrediting agencies functioning as private entities, as well as a number of state and federal agencies in the public sector (Crippen, 1981; Kaplin & Hunter, 1966) are directly and indirectly involved with identifying and determining academic quality and with encouraging institutions to maintain and enhance academic quality. Regional accrediting associations serve many purposes, but the public identifies them primarily with their quality assurance function. Various higher education consumers rely heavily on the judgments of regional accrediting associations to satisfy concerns about institutional quality. Students, faculty, employers, federal and state governments, and the public in general see regional accrediting association approval as evidence that an institution meets qualitative criteria (Troutt, 1979, p. 200).

In fulfilling its role, accreditation focuses on two concerns: (a) educational quality, defined and interpreted within the context of the institution's or program's own statement of scope and purpose as compared with similar

institutions and programs, and (b) institutional integrity, that the institution or program is what it says it is and does what it says it does. Accreditation agencies have evaluated and encouraged educational quality by looking at conditions that have been believed to be necessary and desirable to produce educational quality (input, resources, and process) and by looking at evidence that the institution or program has indeed achieved educational quality (outcomes) (Young, 1983, p. 25).

Accreditation is the outcome of an evaluative process guided by criteria generally based on judging an institution or a program in the light of its stated purposes. Through this process the accrediting agency provides an assurance of the educational quality of its members to the educational community, the general public, and other agencies or organizations. In addition to its judging function, the accrediting association serves an enabling function. It encourages institutional and program improvement through continuous self-study and evaluation; it provides counsel and assistance to established and developing institutions and programs; and it protects its members against encroachment that might jeopardize their educational effectiveness or academic freedom (Armstrong, 1962; Thrash, 1979).

Relative to accreditation, quality has generally been defined as "institutional effectiveness in achieving

appropriate educational objectives" (Millard, 1986, p. 1); or "quality in education relates directly to the educational appropriateness of objectives and to the effective use of resources in achieving those objectives" (COPA, 1986, p. 1). The literature, however, shows that even here the definitions of quality are vague, varied and inconclusive.

> Students, faculty, resources, location, and results are all factors that influence the quality of education. However, the key to bringing these elements together is how well goals and objectives are defined and how appropriate they are to the needs of individual and society. (COPA, 1986, p. 4)

Troutt (1979) reported that accrediting bodies have tried to define quality in terms of evaluative criteria which vary in format, emphasis, and terminology, but they share common areas of concern and similar assumptions about appraising educational quality. These assumptions have been (a) judgments about institutional quality should rest on inferences from certain conditions rather than direct assessment of student performance; (b) no common benchmarks existed for assessing or defining institutional quality; and (c) current accreditation criteria equated higher education with a production process (p. 201).

The six regional accrediting agencies have operationally defined accreditation and quality through proposing standards and criteria that they contend will ensure quality, excellence, and effectiveness. However, these criteria are generally broad and non-specific, with

their interpretation mostly delegated to the institutions or the members of visiting teams.

The number of the criteria also varies. The Middle States Association (MSACS), while maintaining that the quality and characteristics of superior institutions depend somewhat on the type of institution (p. 1), proposed fifteen standards which were described qualitatively, rather than quantitatively (p. 3) and included such items as institutional integrity and outcomes, and further considered them as common denominators among all institutions (MSACS, 1987). The New England Association (NEASC) suggested twelve "qualitative criteria for the measurement of institutional effectiveness" (NEASC, 1983, p. 7) including one on ethical practices.

The Northwestern Association (NWASC) established eleven standards for evaluating quality, candidacy, and accreditation which it defined as the condition in which

> a postsecondary institution's own goals are soundly conceived, that its educational programs have been intelligently devised, that its purposes are being accomplished, and that the institution is so organized, staffed, and supported that it should continue to merit confidence. (NWASC, 1988, p. 3)

The Western Association (WASC) asserted validity for its nine standards,

> as a result of extensive experience and research, the Commission has determined that there are certain basic characteristics of quality required of all institutions of higher education. The Commission has found that institutions can readily maintain their individuality while complying with

> these established standards. These Commission standards, policies, and procedures are periodically reviewed and revised. (WASC, 1988, pp. 2-3)

Finally, the Southern Association (SACS) and the North Central Association (NCACS) have limited their standards to five basic and broad standards. Similar to NCACS (1989, p. 1), the SACS (1988) has maintained that the purpose of accreditation has been to improve educational quality; to assure the public that the institutions meet established standards (p. 7); and that these criteria assist the institution "to achieve overall effectiveness in all areas of its growth and ensure the quality of its educational programs" (p. 9).

A comparison of the standards reveals that the six agencies concur on five of the standards, thus implying a higher level of importance for them. These common standards include (a) institutional mission and objectives & purpose, (b) educational programs, (c) library and learning resources, (d) financial resources, and (e) administration.

Evidently, the accrediting bodies refrained from establishing specific and formulated standards. Troutt (1979) attributed this phenomenon to the fact that the accrediting agencies universally disapproved "quantitative benchmarks that bear no relation to institutional quality," and added "Current accreditation standards generally assume, though, that no quantitative standards or common benchmarks are acceptable" (p. 202).

> Judging quality is not easy. It cannot be reduced to quantitative indices or formulas. Such judgments are made by gathering appropriate information about an institution or program and by having knowledgeable people appraise it. This is the essence of the accreditation process. (COPA, 1986, p. 4)

Accreditation has been both praised and condemned. While it has been credited with significant contributions to the enhancement of the educational quality and effectiveness (COPA, 1986, p. 1), it has also been the target of serious criticisms from its early days. In 1939, Samuel P. Capen, chancellor of the University of Buffalo, called the accreditation officials "a horde of irresponsible outsiders, each representing a separate selfish interest" (Young, 1983, p. 13). Pinkham (1952) described accreditation as an "elusive, nebulous, jellyfish term that means different things to the same people . . . who do not agree on what it is they do not agree, and, I might add, on which they disagree violently, emotionally, and dogmatically" (p. 47); Wriston (1960) considered it a wasteful process based on superficial judgment which "seeks not only to compare apples with grapes, but both with camels and cods" (p. 320); and finally Kells (1976) maintained that the word 'accreditation' is so misunderstood and so abused that it should be abandoned" (27).

Current criticisms, however, aim more at the inability of the accrediting agencies to define, assess, and improve quality. Trout (1979) contended that "available research

cannot substantiate the claim that certain accrediting association criteria assure institutional quality" (208). Hefferlin (1974) charged that accreditation's evaluative criteria failed to relate in any way to the educational accomplishments of students, and Orlans (1975) maintained that regional accreditation has stopped, for the most part, making quality distinctions. Gollnick & Kunkel (1986) cited ambiguous standards, ignoring factors essential to the quality of programs, failure to apply standards consistently, bias against certain types of institutions resulting from uneven application of standards have often been cited as the concerns over accreditation evaluations. Some of this problem results from the fact that accreditation criteria, despite their importance, have not received sufficient attention from "researchers or scholars in higher education, to the extent that even criticisms of accreditation criteria fail to offer any detailed information either about specific accreditation criteria or their overall character" (Trout, 1979, p. 200).

Solmon (1981) maintained that simplistic notions of quality have been developed for use in the accrediting process. He maintained that the periodic accreditation evaluations by professional associations and regional accrediting bodies more closely "resemble a 'pass-fail' system than a system of grades: certain minimum standards

are required, but no differentiations or comparisons are made among those that pass or among those that fail" (p. 7).

Accreditation has at times been more concerned with process than with results and has tended to evaluate institutions and programs more on the basis of resources than on how and for what purposes they are used. In professional areas, it has at times appeared to be more interested in professional status than in the quality of educational preparation for entry into the field (COPA, 6). This application of an industrial model has also been cited as one of the reasons for criticism. To elaborate, Troutt (1979) concluded that "instead of checking on the quality of production outcomes, that is, student achievement, criteria generally check on the quality of the assembly line, namely, curricula, faculty, resources, etc." (p. 203). In general, the accreditation evaluation has accepted at face value a correspondence between resource availability and the likelihood of achieving goals (Troutt, 1979). Therefore the process, while failing to examine the relationships between resources and goal achievement, becomes the rating of quality based on factors, such as number of library books, faculty members with doctorates, and students per classroom, while alumni achievements and students' satisfaction with their educational experience have not. This implies, on the part of the accrediting body, a direct relationship between the quality of the assembly line and the quality of the

product, leading to such actions as the AACSB's (American Assembly of Collegiate Schools of Business) refusal to grant accreditation to the University of Hartford based on insufficient number of faculty with Ph.D.s (implying that professors--assembly line components--need Ph.D.s to be good teachers), despite a 100% placement rate of the graduates--product (Sandholtz, 1989).

Reliance of the federal and state governments on accreditation for such issues as certification, licensure, funding, etc., has created the threat of governmental involvement in higher education and at the same time, has eroded its voluntary nature (O'Neill & Heaney, 1982, p. 57). Institutional support is also missing. Accreditation matters are usually handed to "program directors who necessarily have a narrow view, namely, their particular program. Accreditation, even for one program, however, is a matter for the whole institution" (58). In 1978, dissatisfaction with COPA was running so deep that there was talk of reviving the National Commission on Accrediting, because many college presidents felt that it simply was not protecting the institutions against specialized agencies (Jacobson, 1980, 1, 10). At the same time, COPA's efforts to improve the accreditation process was not receiving support from the higher education community (Saunders, 1978, 65). Under these circumstances, a more aggressive role for agencies is advocated,

> accreditation is more than a passive process of promoting self-improvement. Direct involvement is needed for such improvement, although it is not pursued. Direct involvement [was] defined as action by a representative of an accreditation agency(e.g., a member of the professional staff or site visitor) that resulted in some observable improvement in educational quality. (Jung, 1986, p. 2)

Institutional self-study and peer evaluation have been basic to the process of accreditation (Young, 1979). The results of these analytical institutional or program self-studies have contributed to sustaining and enhancing educational quality. "Such self-evaluation is an essential component in accreditation" (COPA, 1986, p. 5). Yet, similar to the accreditation criteria, this first and most important step has not had "a thorough empirical study" (Kells & Kirkwood, 1979, p. 25).

To eliminate such flaws, accreditation has constantly moved from quantitative measures to more qualitative standards and increased emphasis on peer judgment, and "from a primary emphasis on process and resources to increased concentration on results and learning outcomes" (COPA, 1986, p. 6). An over-emphasis on this new approach, however, has posed some potential dangers such as over-dependence on formulas, quantitative results, and the dangers of homogenizing; confusing assessment with testing and moving toward standardized testing (uniform tests indicate not quality but minimum expected attainment that can easily be confused with maximum expectations); replacing one type of

quantification with another; confusing assessment of learning outcomes with the effectiveness of an institution as a whole; and overlooking the relevance of process and means to results or outcomes, because process and outcomes constitute a continuum (Millard, 1987).

General Systems Theory

The failure to take a total system approach to institutional evaluation is probably the main reason for the failure of these evaluative attempts. "Institutional effectiveness is a function of how well it [the institution] accomplishes all of its objectives and its mission as a whole, not just one part--as important as that part may be" (Millard, 1987, p. 2). This notion is in accordance with the main postulate of the Attributive Theory of Quality that defines and measures quality of a phenomenon as the interactive sum of all the necessary and sufficient properties that comprise it, leading to the adoption of the general systems theory for the analysis of the phenomena and for model building. This approach is appropriate because the systems theory, advanced by Bertalanffy (1968), represents "a holistic view of phenomena, a recognition that it is the nature of the relationships among parts rather than the nature of the parts themselves that makes each system unique" (Silver, 1983, p. 60). The general systems theory, according to Boulding (1968), "studies all thinkable relationships abstracted from any concrete situation or body

of empirical knowledge. It is not even confined to 'quantitative' relationships narrowly defined. . ." (p. 3). To further this notion, Johnson et al. (1976) indicated,

> we are using this philosophy as a way of thinking and of seeing the world around us and are stressing the idea of logical, thorough, and methodical thinking. The systems philosophy becomes a way to relate complex ideas, principles, and laws so that they become meaningful. (p. 63)

General systems theory is in accordance with the scientific or positivistic approach to knowledge production in that it aims at discovering "constancies or predictable patterns in the flow of information and energy as forces bearing on systems, and it promotes the search for quantifiable factors in the relationships among parts" (Silver, 1983, p. 60). Application of systems theory to social organizations and phenomena has been advocated. Starling (1975) maintained that systems concepts could simplify complicated social groupings and make them understandable, especially when social organizations were increasing in numbers and in levels of social complexity. Johnson et al. (1976) stated,

> when used in this context, the term systems connotes plan, method, order, and arrangement--the development of a systematic theoretical framework for describing general relationships of theoretical model applicable to many disciplines, whether physical, biological, behavioral, or social. A distant goal of systems theory is to develop a framework (or system of systems) that will ultimately tie all disciplines together into an understandable, cohesive whole. (p. 59)

Similar to the word quality, the term system has become "a common word in our vocabulary. Most people use the word as an everyday expression to describe what they do and how they live" (Johnson et al., 1976 p. 57). However, unlike quality, the concept of systems seems to be more uniformally and clearly understood. A system has been defined as

> an integrated assembly of interacting elements designed to carry out cooperatively a predetermined function. (Flagle et al., 1960, p. 58)
>
> a group of interdependent elements acting together to accomplish a predetermined purpose. (Chorofas, 1965, p. 2)
>
> a set of objects together with relationships between the objects and between their attributes. Our definition does imply of course that a system has properties, functions or purposes distinct from its constituent objects, relationships and attributes. (Hall & Fagen, 1968, p. 81)
>
> (1) something consisting of a set of (finite or infinite) entities; (2) among which a set of relations is specified, so that (3) deductions are possible from some relations to others or from the relations among the entities to the behavior or history of the system. (Rapoport, 1968, p. 453)
>
> An organized "something" that has direction to it and some degree of internal unity. The structure or organization of an orderly whole which clearly shows the interrelationships of the parts to each other and to the whole self. (Blendinger, 1969, p. 50)
>
> A group of interrelated parts, elements, processes, components, functions, etc., which together accomplish some specific objective. (Atwood, 1977, p. 2)
>
> An organized or complex whole, an assemblage or combination of things or parts forming a complex or unitary whole. . . . When relating systems to organizations, it may be even more meaningful to define a system as "an array of components

> designed to accomplish a particular objective according to plan. (Johnson et al., 1976, p. 59)

Kimbrough & Nunnery (1983) cited the "common threads among several definitions" (p. 299) and emphasized the three concepts of interdependence, interrelation and relationships, maintaining that "organizations, as well as other systems, are composed of interacting subsystems, each of which makes a contribution to the system of which it is a part" (p. 300). Blendinger (1969) stated that the focus on wholes, parts, and the relationships among the parts "provide an opportunity for logical linkage among many conceptualizations of a nonglobal nature" (p. 319), and further listed four essential criteria for a system, (a) a structure or organization, (b) the structure or organization conceptualized as an orderly whole, (c) relation of parts to each other, and (d) the relation of the parts to the whole. A system, he added, could be described by a boundary within which everything is a part or element of that particular system. Riley & Riley (1959) indicated that interdependency in a model of a social system suggested that introducing any form of change, however insignificant, into a system would impact the whole system until it reached a state of equilibrium; a concept of utmost importance to higher education.

The system framework is comprehensive and covers a number of concepts such as systems theory (the set of related concepts or the body of knowledge that is

fundamental to all systems), systems analysis (the application of modeling and problem solving), systems philosophy (a way of thinking), and systems management (the design and operation of organizations as systems) (Johnson et al., 1976). The first two are pertinent to this study.

Systems Theory

The systems theory is the second theoretical basis of this study, specifically utilized for model building and data calculation. Boulding (1968) stated,

> general systems theory is a name which has come into use to describe a level of theoretical model-building which lies somewhere between the highly generalized constructions of pure mathematics and the specific theories of the specialized disciplines. Mathematics attempts to organize highly general relationships into a coherent system, a system however which does not have any necessary connections with the "real" world around us. (p. 3)

Miller (1978), looking at the analytical dimensions of the systems theory, described it as "a set of related definitions, assumptions, and propositions which deal with reality as an integrated hierarchy of organizations of matter and energy. System theory is, in part, an approach, a frame of reference for analysis" (p. 9), and Rapoport (1968) described it as a "program or a direction in the contemporary philosophy of science aimed at the integration of diverse content areas by means of a unified methodology of conceptualization or of research" (p. 542).

Johnson et al. (1976) emphasized the point that the whole was fundamental in systems theory, and indicated that

in this approach,

> (1) the whole is primary and the parts are secondary; (2) integration is the condition of the interrelatedness of the many parts within one; (3) the parts constitute an indissolvable whole such that no part can be affected without affecting all other parts; (4) parts play their role in light of the purpose for which the whole exists; (5) the nature of the part and its function is derived from its position in the whole and its behavior is regulated by the whole-to-part relationship; (6) everything should start with the whole as a premise, and the parts and their relationships should evolve. (p. 59)

The utility of systems approach, if not as a theory, is significant as a methodology for transferring abstract concepts into concrete, practical contexts. According to Kimbrough and Nunnery (1983),

> systems theory is not a set of assumptions from which empirical laws can be derived by logico-mathematical procedures; it does not constitute a universal, all-inclusive, substantive body of thought. In fact, some scholars have suggested it is not even a "theory," but a methodology, and one that is empirical and interdisciplinary. (p. 320)

Systems Analysis

Closely related to systems theory--for the purposes of model-building and problem-solving--is the concept of systems analysis, which along with design, is central to the systems approach (Blendinger, 1969). Analysis is defined as the process of dissecting and examining the parts and components of a whole and their relationships. A system may be broken down "for the purpose of analysis into clusters or subsystems of relative interaction and heightened interdependence" (Brewer, 1975, p. 180). Therefore, system

analysis is "the task of examining the parts, elements, processes, components, functions, etc., which make up a system so as to determine their relationship to each other and how each contributes to the accomplishment of the objective of the system" (Atwood, 1977, p. 2).

Similarly, Blendinger (1969) defined systems analysis as the process of breaking down or taking apart an existing whole into its constituent parts or elements for the purpose of depicting the relationship of the parts to the whole and to each other. "Analysis involves the reduction of complex entities into their component segments so that each segment can be studied" (p. 50). The level of analysis (breakdown) should, however, be predetermined, albeit, arbitrarily, because the process of breaking down components can be carried on to undefined number of levels. To restrict this process, Johnson et al. (1976) defined the basic component in terms of input/output,

> in such instances, we can say that the transformation process occurs in a "black box"--and we know only what goes in and what comes out, nothing else. We can use this "black box" approach to demonstrate the role of components. A basic unit, or "black box," which performs, or provides the facility for performing, some part of the defined transformation process will be defined as a component. For our analysis, there is little value in subdividing or describing this part of the system beyond input and output. . . . Systems, subsystems, and components, then, are determined by definition. (p. 63)

In relation to complex systems such as higher education institutions, Brewer (1975) maintained

> The greater the organized complexity of a system, the less likely it is that it can be analytically decomposed and the more likely that shortrun behavior of any one subsystem will ramify throughout the entire system. To the extent that a system may be broken down into clusters or nearly-decomposed subsystems, we may separately analyze their individual behavior to enhance our understanding of the behavior of the whole. Decomposed and nearly-decomposed systems are analytically smaller and less complex than the whole. They are brought within the limits of man's analytic capacity. (p. 180-181)

In summary, the goal of the general systems theory is to create "a body of systematic theoretical constructs which will discuss the general relationships of the empirical world" (Boulding, 1968, p. 4) based on which theoretical models can be constructed for decision-making and problem solving.

Model Building

In the language of contemporary science the word model, which is widely used, covers several concepts and ideas. To avoid false representation and misunderstandings, D'Espagnat (1983) believed that scientific views must be expressed in simple and pictorial ways to the relatively indifferent public "to quickly construct an approximate idea about the nature of things, an idea which is rough but is nevertheless preferable to no idea at all. For such an idea may, after all, encourage an interest in a deeper understanding of the subject" (p. 107). Such simple models are implicitly presented as being faithful descriptions of independent reality.

One meaning of model, according to d'Espagnat (1983) is a simplification that the mind performs on the real facts which are considered to be highly complex and hardly manageable, e.g., "reduced model" in technology. These simplified models lend themselves to computation and to verifiable revisions. And, in numerous cases, experiment confirms the validity of the approximations thus made. . . . This type of model is usually regarded to be a simplified but essentially correct description of the 'reality of things'" (p. 110).

Some models are abased theories that can be useful but do not represent reality, even in approximation, and yet another type is a metaphor that tries to express a truth within the framework of known knowledge, the planetary model of the atom being the most remarkable example. The word model is also used in relation to theories that do claim to describe reality itself but whose validity in this respect can neither be proven nor refuted for lack of the means of verification. In any case, it should be noted that a model should not be interpreted as a total and intelligible description of reality as is.

Dilworth (1986) stated that scientists build idealized models based on their knowledge to understand the reality underlying laws of science. "The model should be constructed so as to depict a physically possible, albeit idealized, reality whose existence would naturally manifest

itself in the laws requiring explanation" (p. 155). He further added that such a model represented a phenomenon as it related to scientific laws when the aspect of reality which was responsible for it was not open to direct inspection. Considering that these models depict the hidden aspects of reality that constitute "the essence of scientific theories, we can characterize theoretical terms as terms used in referring to those entities in the real world (should they exist) as are depicted in such models" (p. 155).

In comparing scientific models with myth, d'Espagnat (1983) asked whether the scientific models were the myths of the time, or if they were antimyth? He considered their relationship subtle and stated that "with regard to the use of myth by the poet of the old and model by the modern scientist, in both cases the choice was (and is) motivated by the impossibility of exactly conveying a particular truth through everyday language" (p. 109). There are at the same time similarities and differences.

> The main similarity is, of course, that both are symbolic. It is always an error to take them literally. In this respect, the myth of Prometheus, the myth of Paradise on earth, and the planetary model of the atom are quite obviously similar. Another similarity is that, nevertheless, neither myths nor models should be considered to be arbitrary inventions. Both are viewed as symbolic descriptions of something real. A third similarity, the most essential perhaps, is that myths and models play a positive role. (d'Espagnat, 1983, p. 108)

In general, models are less ambitious than myth, and therefore are more reliable. It is also appropriate here to again point out that, unlike a theory, a model, as soon as it has been acknowledged as such, is not discredited by some false consequence of it, but that, quite the opposite, it often remains useful in its own domain long after such an imperfection has been discovered (d'Espagnat, 1983, p. 112).

According to Johnson et al. (1976), a model captured the essence of a system without being bound by the details. This method of system analysis presented a somewhat abstract view of the system and provides the necessary information for improving quality and decision-making, "the more appropriate the model to the actual situation being analyzed, the more valuable model building is as a tool in analysis (p. 68).

To build a model based on the systems theory, Johnson et al. (1976) prescribed the following steps: (a) systems determination, (b) design and creation, (c) operation and control, and (d) review and evaluation. Analysis determines the system and its design and creation. According to Blendinger (1969),

> design, the other important technique in a systems approach, differs from analysis in that it is a putting together, or a synthesis, rather than a taking apart. Analysis must precede synthesis because design decisions cannot be relevant or practical without prior specification of appropriate tasks to achieve specific purposes. (p. 391)

In the design stage, subsystems and components of the model are arranged in some combination to transform inputs and produce output. These parts of the system must be arranged in a planned order, for example a hierarchy, to achieve the optimum output. "One advantage of exhibiting a hierarchy of systems in this way is that is gives us some idea of the present gaps in both theoretical and empirical knowledge" (Boulding, 1968, p. 8). The information during the design stage determines the exact and proper way to organize the system so as to accomplish the objectives (Johnson et al., 1976). The design should be tested through operation and evaluation, because basic to the theory of systems is the premise that with certain inputs, the model produces certain outputs or operates within established limits, its effectiveness determined by subsequent evaluation.

Subjectivity, Objectivity and Intersubjectivity

Subjectivity and objectivity, in both perception and measurement, were recurrent themes in the reviewed literature. A significant part of the available corpus encompassed an ongoing debate between the proponents of objectivity and subjectivity, or more accurately those assigning a higher validity to one approach over the other. Recent literature, however, reflected the belief that to many "subjectivity and objectivity . . . are two sides of the same coin" (Dallmayr, 1981, p. ix), and rather than one

being the antithesis of the other, a degree of each is present in the outcome of all evaluations and decisions. In this vain, the intersubjective approach has been advanced as the method of perception and measurement of such concepts as quality.

Objectivism has been defined as "the doctrine that things or qualities or values exist in their own right independently of the knower and of the conditions of knowledge; the assertion of the universal validity of principles, values, and so on, as opposed to subjectivism" (Honer & Hunt, 1978, p. 246). Deutscher (1983) considered objectivity as "a characteristic of one's approach to or attitude to things. To be objective is to have an attitude such that one's understanding of and opinions about a thing are drawn from and worked out in continual interchange with it" (p. 136). Kupperman (1978) asserted that an idealized truth, however approximate, existed for any reality, and this truth formed the basis for the important claim, "that there is a single optimal account or description of any set of events or states of affairs, such that any competing account or description is either inferior or synonymous. We may call this claim the claim of objectivity" (p. 150).

Objectivity, commonly held up as an ideal, is considered as an "intellectual, moral, emotional, and sensual virtue, [and] is the capacity and preparedness to draw one's ideas and attitudes, and to gain one's emotions

and feelings from their own objects" (Deutscher, 1983, p. 40). Objectivity is valued because it is perceived to result in impartiality of evaluation, correctness of opinions, fairness of judgments, control of emotions and feelings, and reliability of measurements. It is also associated with validity in science and scientific work.

Emphasis on objectivity, particularly through the use of statistical methods, gained strength in the early decades of the twentieth century and dominated science in general, and the evaluation and measurement in education and other social sciences in particular. This dominance and perceived preference, however, has been seriously questioned during the past two decades.

> Some people believe it is possible to measure just about anything objectively, including the quality of education. If they are right, higher education can certainly dispense with accrediting agencies and turn their work over to social scientists and computers. Then, before long, higher education will also be able to dispense with the social scientists. (Orlans, 1973, p. 218)

Deutscher (1983) dismissed objectivity as "a vain search for an idealistic impossibility" or "a cold removal of oneself from the stage of "real life". It has also been implied that "the gains of objectivity are, in a sense, only imaginary: the suspicion, supportable by at least some fact, is that the cool detached removed observer does not really know what is going on" (p. 42). One of the harshest attacks on this type of objectivity, however, came from Poole (1972),

> objectivity (what is in question is not adequate objectivity, achieved after an analysis which integrates the subjective into its result, but that impoverished fragment of human reason with which we are only too familiar), is made up of a regress tautologies. . . . [Tautology defined as] Applied to the repetition of a statement as its own reason, or to the identification of cause and effect.' It is in that sense of self-referring closedness towards external criteria that I use the word here. (p. 44)

This objectivity, defined as social and political status quo, encompasses all the unquestioned assumptions, presuppositions, and attitudes that the society accepts as being the case, that is objectively valid. "Objectivity is the belief in objectivity as such. By definition, objectivity is that which holds itself in place as the dominant and unquestioned objectivity of a given society" (Poole, 1972, p. 44). In this context, objectivity assumes objects to be lifeless, non-conscious and deals with them as such, or tries to make the subject an object "in relation to the things which inevitably do surprise us with their independent forces, chemistry, and inner and outer autonomous lives" (Deutscher, 1983, p. 42).

Kupperman (1978) reported that earlier in this century, a number of philosophers denied the objectivity of ethics. Later the objectivity of history and social sciences, and even the physical sciences were challenged, "mainly on the grounds that theoretical assumptions interact with scientific data in such a way that it becomes implausible to speak of an objective collection of scientific data." This

is because "what we experience has a great deal to do with the concepts with which we are armed, the systems of measurement we accept, and the theoretical assumptions that delineate the possible results of experiment" (p. 150). He further states that "there is no reason to assume that all kinds of statements that people make have equal claims to, or hopes to, attain objectivity . . . [suggesting that] no knowledge developed within a linguistic frame work can reach the ideal of objectivity. (p. 150).

On the other hand, subjectivity, commonly construed as the opposite of objectivity, has received increasing attention in the recent decades. Honer and Hunt (1978) defined subjectivism as "the doctrine that all things that exist, exist only as the knowing and experiencing of conscious beings; that the world exists only for the mind, and thus all existence is composed of minds and ideas; dependence on mind or on consciousness" (p. 246). They further defined subjective idealism as "the theory of perception that maintains that what can be known is limited to a person's idea; therefore, the ideas of a particular perceiver constitutes reality (p. 246).

Wheelwright (1960) maintained that subjectivism opposed positivism by denying that the world described by science really exists. "It declares all scientific objects, whether conceived as matter in motion or as statistically computed units of energy, to be imaginary constructs whereby the

concrete data of experience are explained by being fitted into a coherent conceptual system" (p. 125). Reiterating the eighteenth century Irish philosopher, George Berkeley, Wheelwright added,

> the real world represents the way in which the perceptions of fairly normal observers are collectively interpreted. It is only by perceptions that the world can be known. . . . Esse est percipi: to be is nothing else than to be perceived. Such is the challenging subjective principle to which Berkeley's argument leads. . . That is to say, the materialist's supposition of objects existing apart from some mind's actual engagement in knowing them is meaningless in the sense of being a barren abstraction, for which no relevant evidence has been, or ever can be, adduced. (p. 125)

However, subjectivism, despite its apparently convincing arguments, opposes man's inherent and relatively strong belief in the existence of "external world independent of anyone's sensing of knowing it" (p. 125). In this context, the term subjectivity has been used pejoratively to imply the subjects' immersion in their own sensations rather than responding to the objects of those, and to associate individuals with idiosyncrasy, especially when their actions or thoughts seem unusual or distinctive to them. These implications, according to Deutscher (1983) were thoughtless because they presupposed the conclusion that individuals were "in error or out of touch with things, from the observation that they are unusual in their perceptions and judgments" (p. 41).

Brightman (1945), while partially accepting the subjectivists' view that many evaluations were subjective, maintained that it was not possible to prove that all values or opinions were subjective, and that it was difficult to distinguish between the subjective and objective. In relation to this difficulty, he added, "subjectivism represents the surrender of thought in the presence of great difficulty; objectivism confronts the same difficulty but keeps up the fight toward truth about reality" (p. 153). His belief in objective standards, even if partially known, was so strong that he asserted without them "reason will collapse" (p. 160).

The proponents of subjectivity, however, have maintain that arguments against subjectivism drawn from the so-called "real world" cannot refute or weaken its logic, because "the subjectivist argument fortifies itself by declaring that both the world and all the evidences ever drawn from it are but groups of ideas ordered in certain familiar ways" (Wheelwright, 1960, p. 125). Deutscher (1983) asserted that

> when one eliminates the confusions underlying the pejorative sense of "subjective", it is possible to see that objectivity is a form, a style, an employment of our subjectivity, and not its antithesis. . . . A person's subjectivity, in the descriptive, unabusive sense which I favour, is the tissue of his or her knowledge, opinions, emotions, feelings, and tastes, which yields the flavour, the style, the personalness of his or her approach to things. . . . With some banality, but little prejudice, we can speak of a "point of view" and say that objectivity is possible only within a point of view and is thus a quality of one's subjectivity. (p. 41)

To resolve the dispute over the validity of either the objective or subjective approach in portraying reality, philosophers of science have reverted to the intersubjective approach. Intersubjective has been defined as "used and understood by, or valid for different subjects. Especially, language, concepts, knowledge, confirmability. The character of science is especially emphasized by scientific empiricism" (Runes, 1984). According to Feyerabend (1981), Aristotle considered knowledge as "a complex social product that influences every generation, may even dominate it, but which is also changed and improved by collaboration of many generations" (p. 183).

Titus (1964) defined subjectivism, or more technically epistemological idealism, as the belief that the "objects and qualities do not exist independently of a consciousness of them. Reality consists of consciousness and its states, though not necessarily my consciousness and my states of mind," (p. 44). On the other hand, objectivism, or epistemological realism, asserted that an independent reality exists apart from minds. Between the two, Titus placed phenomenalism or epistemological dualism, whose followers contend that people can only know phenomena and not the ultimate reality, and that the external world, as perceived by subjects, is not necessarily the same as or even similar to the external world that stimulates their

senses. Convergence of subjective views, however, can result in a realistic understanding of the world.

Dallmayr (1981) considered intersubjectivity as a "handy launching-pad for excursion into less familiar terrain" and attempted to explain intersubjectivity by posing these questions,

> to what extent is social or political practice an outgrowth of human agency or a human subject, and what is the meaning of subjectivity? In what sense can social and political life be said to emerge from human interaction or intersubjectivity? Does intersubjectivity denote an aggregation of human actors, and how is such aggregation intelligible? (p. 39)

Nagel (1986) assumed a close connection between objectivity and intersubjectivity, and rejected the appropriateness of pure objectivity for explaining the phenomena,

> so far as the content of the objective view goes, it might be of a world in which I, its subject, never have existed and never will. But since the objective conception has a subject, the possibility of its presence in the world is there, and it allows me to bring the subjective and objective views together. Until they are brought together in this way, the purely objective conception will leave something out which is both true and remarkable. (p. 64)

Brown (1977) contended that the evaluation and acceptance of scientific proposals as a part of science by the community of qualified scientists required that the objective theories be intersubjectively testable. The critics, however, have argued that by relinquishing the "ultimate decision on scientific questions to the scientific

community, rather than with an impersonal testing procedure, will introduce subjective factors into the confirmation process" (p. 154) and is not consistent with the very notion of objectivity as it bases a body of knowledge on "fallible presuppositions" (p. 154) leaving the scientific knowledge without a foundation. In defense, Brown (1977) stated that these presuppositions were subjective and that altering them would change not only the body of scientific knowledge,

> but the kinds of questions scientist ask and the standards for judging what is scientific. Thus science becomes an arbitrary construct and there is no reason to take any proposed body of theory to be more valid than another. (p. 154)

Feigl (1953) contended that the term intersubjective reflected the social nature of the scientific enterprise and considered intersubjective testability more adequate than the general concept of objectivity for formulation of science, arguing that this approach, besides being free from bias or partiality, required that the knowledge-claims of science be, at the least indirectly and to some degree, confirmed or disconfirmed by those knowledgeable in the field. He further added that in order to validate knowledge-claims, they must be formulated in an intersubjectively understandable manner, and then subjected to the appropriate kind of tests in order to ascertain their validity. He considered the beliefs otherwise generated as

> theological or metaphysical and therefore devoid of the type of meaning that we all associate with the knowledge-claims of common sense or factual science . . . If there be any "truths" that are

> accessible only to privileged individuals, such as mystics or visionaries--that is, knowledge-claims which by their very nature cannot independently be checked by anyone else--then such "truths" are not of the kind that we seek in the sciences. The criterion of intersubjective testability thus delimits the scientific from the nonscientific activities of man. (p. 58)

Finally, d'Espagnat (1983) defined intersubjectivity in the context of weak objectivity, reached when a statement or concept was invariably valid for any observer and differing from subjectivity through this invariance, maintaining that "even a die-hard realist could not deny that weak objectivity is sufficient for development of science, at least so long as it refrains from any claim of describing what lies beyond human experience" (p. 58).

The public's focus on high quality products is intensifying. Therefore, dealing with quality and quality-measurement issues will continue as one of main and critical tasks of higher education in the coming decade. The need for a systematic and realistic approach to defining and measuring quality is more acute now than ever before.

CHAPTER IV
RESEARCH METHODOLOGY

> Mind cannot form any notion of quantity or quality without forming a precise notion of degrees of each.
> (Hume, 1975, p. 393)

> But then Number is the Idea of Things.
> (d'Espagnat, 1983, p. 51)

Introduction

The primary purpose of this study was to advance the Attributive Theory of Quality as the basis for defining and measuring quality, especially as it related to the higher education institutions. Then, to illustrate how the proposed theory could be operationalized, a model based on the general system theory was developed on Lotus 1-2-3 spreadsheet to perform the calculations. Subsequent to a simulated run, the model was tested with illustrative data collected from five community college libraries, and the results were verified against a set of similar data acquired from a panel of SACS experts.

The Attributive Theory of Quality defines quality as the interactive sum of all the necessary and sufficient properties (components/subsystems) that constitute a phenomenon (system), prescribing a systems approach to measurement. Consequently, three types of data were needed

to conduct a model illustration, (a) the components and subsystems of one type of higher education institution (Carnegie, 1987), (b) the weight (importance/contribution factor) of each component and subsystem within the system, and (c) the value (a numeric value indicating the condition) of each component. At this point, it should be re-emphasized that the terms weight and value, as used in this study, represent concepts that are different from the concepts of weight and value traditionally used in other fields, particularly in Decision Theory and related areas (as previously stated in Chapter III). In the context of the Attributive Theory of Quality, weight represents the factor of importance or contribution of a component or subsystem to its respective subsystem at the next level of hierarchy, and ultimately to the system. Similarly, value represents a component's condition or the degree to which it is present (available).

Obviously, since the Attributive Theory of Quality is presented for the first time in this study, the criteria and methodology for defining and determining weights and values in the context of the said theory do not exist, and establishing them necessitates several studies that exceed the parameters of the present study. Similarly, based on the analysis of the available related literature, a systems approach to institutional evaluation has not yet been adopted, and as a result, a comprehensive systems analysis

for identifying the components and subsystems of a higher education institution has not been conducted. This, too, entails several major studies and is, therefore, beyond the scope of this study.

However, in order to proceed with an illustration, the components and subsystems of one unit of a higher education institutions, namely the library, was adopted. The breakdown of this unit into components and subsystems--although neither conclusive nor uniform--has been outlined by the Southern Association of Colleges and Schools (SACS) for accreditation purposes. The graphic depiction of this outline, reflecting the system's hierarchy, is shown in Figure 2. The textual basis of the outline was adopted from the SACS's 1988 Handbook for Accreditation (Appendix A). It should be noted that (a) replicating this methodology to encompass the total institution will only extend the illustration; actual measurement is possible only after the required data have been acquired through the research activities outlined in the previous paragraph, and (b) other measurement models might be developed to perform the calculations within the parameters of the Attributive Theory of Quality and the general systems theory.

Once the underlying theory of the study was formalized and evaluated, an illustration of the operationalized theory needed to be undertaken. For this purpose, the study was divided into two stages. The first stage had five phases,

(a) development of the model, (b) development of the data collection instrument, (c) site visits and data collection, (d) calculation and tabulation of the values and weights, and (e) testing the model with the acquired data. Stage two included (a) collection of data from the SACS expert panel and tabulation of the data, (b) comparison of the results of the model with the outcomes of the panel's views, and (c) analysis of the findings.

Research Perspective

The Attributive Theory of Quality is a descriptive theory of the classification type--explaining the structural interrelationship of the dimensions or characteristics of a phenomenon--and as such requires a descriptive (explanatory) research approach (Fawcett & Downs, 1986, p. 4). This type of research is directed toward answering questions such as "What is this?" (Diers, 1979, p. 103), and "What are the existing characteristics of the real world relative to the specific question?" (Payton, 1979, p. 44).

As previously stated, conducting a full-scale data collection research, especially in absence of such fundamental data as comprehensive systems analysis or parameters for weights and values, is beyond the scope of this study. However, for illustrative purposes, a study was undertaken to apply the Attributive Theory of Quality to the evaluation of five community college libraries. This study was designed to illustrate the process through which a group

of evaluators or an institution would assign weights and values to the components, e.g., equipment, public service holdings of the library, or number of service staff, etc., and the subsystems such as collections of support programs, and how these weights and values interact to produce numeric values as the indicators of institutional quality.

Research Population

The study populations consisted of five community college libraries in Florida. Florida's network of 28 community colleges are providers of essential academic, vocational, and life-long training and education to all sectors of the population, and as such, are an integral part of the state's higher education system.

Selection of Samples

Five Florida community college libraries were selected for this study. The primary reason for selection of community colleges vis-a-vis other types of institutions was that the fundamental structure, control, regulatory bodies, funding methods and sources, and several other features of Florida community colleges, regardless of their geographical location, are practically identical. This meant that the variations in the quality indicators were institution-specific and were not the caused by factors such as the type or mission of the institutions.

The professional staff (full-time librarians) were selected for interviews, because these expert subjects

acting as "key informants. . . could produce richer data" (Bogden & Biklen, 1982, p. 63). Prior to visiting the sites, permission to meet with the library staff was obtained from the deans or directors of the learning resources. The professional staff of the libraries, including the director or head librarian at each location, participated in this study. The descriptive profiles the staff who participated in the study, are as follows:

Library A: All three subjects at this location had MLS degrees and their professional experience as librarians was 25, 16, and 2 years respectively. One of the subjects had completed several graduate courses in another discipline.

Library B: The subjects at this location had MLS degrees and 21, 18, and 10 years of experience. One of the subjects had a Ph. D. and a second master's degree in another discipline. One other subject had a second master's degree.

Library C: The subjects at this location had MLS degrees and 19, 19, and 15 years of experience each.

Library D: The subjects at this location had MLS degrees and 18, 17, and 11 years of experience each.

Library E: Two of the subjects at this location had MLS degrees with 25 and 22 years of experience each. The third subject, with 7 years of experience, had a number of graduate courses in library science.

Selection of the Panel

A panel composed of 5 community college librarians with experience in accreditation reviews of community college libraries was deemed sufficient for verifying the findings of this study, that is, to ascertain if the global evaluation of a group of experts would be similar to the results generated by the Attributive Theory of Quality illustrative model. To broaden the sample base and to make the random selection of respondents possible, the names of 13 librarians who matched the profile were obtained from SACS. In the process of contacting the individuals to secure their agreement for participating in the study, the researcher was unable to locate 4 of the individuals and, consequently deleted their names from the list. To those who were available, the purpose of the study, along with the role of the panel members, was explained on the telephone. The descriptive profiles of the libraries, based on SACS's standards, were subsequently mailed to the 9 participants, who were asked to evaluate each library based on the information provided in each profile, and then assign a number between 0.0 and 100 to each as the indicator of its quality. To eliminate probable bias caused by any of the members' prior familiarity with any of the subject libraries, alphabetical designators were assigned to the libraries. To randomize the selection of the responses, it

was decided that the first five responses received by the researcher would be selected and entered into the study.

Instrument

The instrument is an interview guide (Appendix C) that was developed by the researcher. The basis of the guide was the breakdown of the institutions of higher education into their hierarchical subsystems and components as delineated by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS) for accreditation purposes. Since this study deals with the library unit only, the instrument was developed to cover this segment of the institution. The graphic representation of this analysis is shown in Figure 2. The textual basis for the breakdown of the library into its components/subsystems is taken from the SACS's 1988 Handbook for Accreditation (Appendix A). From a systems point of view, this breakdown is neither conclusive nor uniform, and further research is needed to identify all the subsystems that are required for an accurate and comprehensive evaluation.

Data Collection

To determine the consensus of the experts, the researcher conducted a series of interviews with the professional staff (librarians) of selected community colleges in Florida. To guide the interviews, the researcher developed an instrument that reflected the hierarchical breakdown of the library as used in developing

the model. The instrument required the librarians to assign weights--percentage figures depicting the importance/ contribution factor--to all the component and subsystem clusters in such a way that the total weight of each cluster (subsystem) would not exceed 100%, and values--a number from 0.0 to 100 reflecting the condition--only to the components, because the values of the subsystems would be calculated by the model. Prior to the interview, the researcher, using the outline expanded in Appendix C, provided the participants with a thorough explanation of the nature, purpose, the theoretical bases of the study, namely the Attributive Theory of Quality and the nature and type of required data including the two concepts of value and weight as related to this study. The researcher also provided the subjects with clear instructions for filling out the interview instrument.

The acquired data were subsequently averaged and tabulated for entry into and calculation by the model. Simultaneously, a panel of experts--a group librarians who had served on SACS's accreditation teams--were identified for providing the required data for validation. In the process of soliciting the panel members' approval for participating in the study, the same information that was provided to the interview participants was presented to them. The panel members were subsequently asked to provide a numeric value from 0.0 to 100 for each of the five

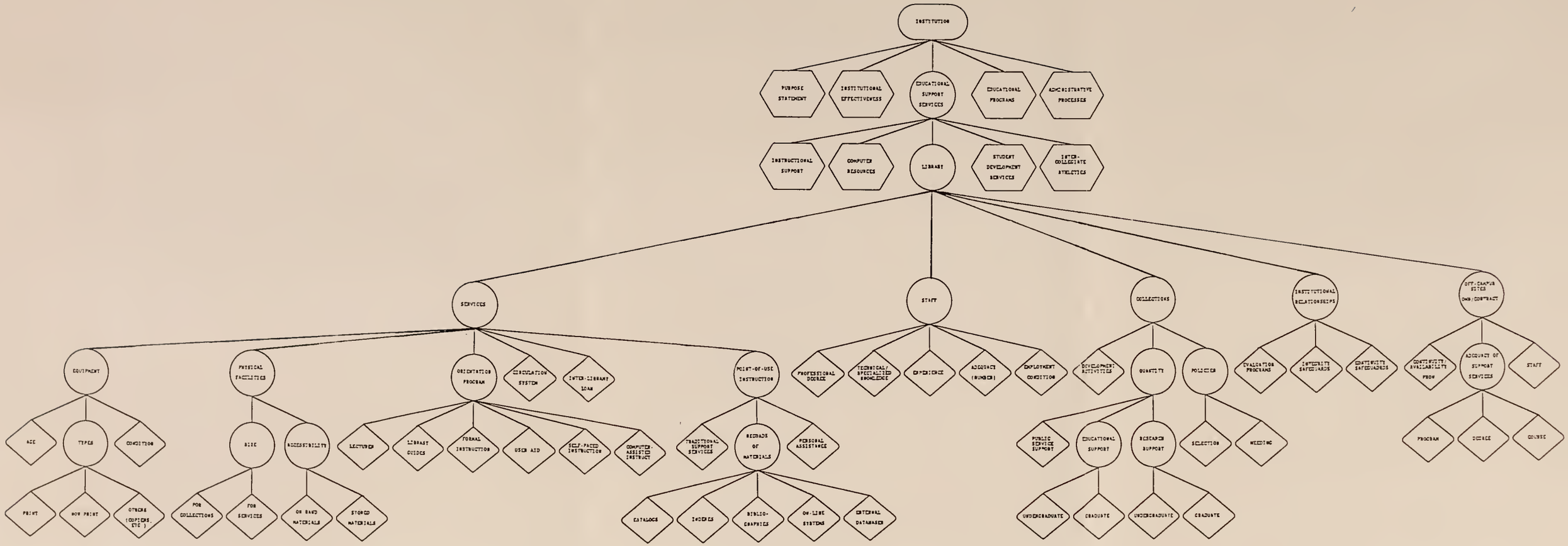

INSTITUTION
PURPOSE STATEMENT
INSTITUTIONAL EFFECTIVENESS
EDUCATIONAL SUPPORT SERVICES
EDUCATIONAL PROGRAMS
ADMINISTRATIVE PROCESSES
INSTRUCTIONAL SUPPORT
COMPUTER RESOURCES
LIBRARY
STUDENT DEVELOPMENT SERVICES
INTER-COLLEGIATE ATHLETICS
SERVICES
STAFF
COLLECTIONS
INSTITUTIONAL RELATIONSHIPS
OFF-CAMPUS SITES OWN/CONTRACT
EQUIPMENT
PHYSICAL FACILITIES
ORIENTATION PROGRAM
CIRCULATION SYSTEM
INTER-LIBRARY LOAN
POINT-OF-USE INSTRUCTION
PROFESSIONAL DEGREE
TECHNICAL/ SPECIALIZED KNOWLEDGE
EXPERIENCE
ADEQUACY (NUMBER)
EMPLOYMENT CONDITIONS
DEVELOPMENT ACTIVITIES
QUANTITY
POLICIES
EVALUATION PROGRAMS
INTEGRITY SAFEGUARDS
CONTINUITY SAFEGUARDS
CONTINUITY/ AVAILABILITY PROV
ADEQUACY OF SUPPORT SERVICES
STAFF
ACQ
TYPES
CONDITION
SIZE
ACCESSIBILITY
LECTURES
LIBRARY GUIDES
FORMAL INSTRUCTION
USER AID
SELF-PACED INSTRUCTION
COMPUTER-ASSIST INSTRUCT
TRADITIONAL SUPPORT SERVICES
RECORDS OF MATERIALS
PERSONAL ASSISTANCE
PUBLIC SERVICE SUPPORT
EDUCATIONAL SUPPORT
RESEARCH SUPPORT
SELECTION
WEEDING
PROGRAM
COURSE
PRINT
NON PRINT
OTHERS (COPIERS, ETC.)
FOR COLLECTIONS
FOR SERVICES
ON HAND MATERIALS
STORED MATERIALS
CATALOGS
INDEXES
BIBLIO-GRAPHICS
ON-LINE SYSTEMS
EXTERNAL DATABASES
UNDERGRADUATE
GRADUATE
UNDERGRADUATE
GRADUATE

Figure 2

libraries based on the profiles (presented in Chapter V) provided by the researcher. These profiles were developed from the information provided to the researcher by the head librarians at each institution. These numbers, too, were averaged and tabulated for comparison with the results of the model.

The Illustration Model

The model for performing the calculations is constructed on the Lotus 1-2-3 spreadsheet. The subsystems and their respective components are presented in 11 of the 13 screens that contain the calculation formulas and also show the structural hierarchy. Although the model is designed to calculate the numeric indicator of the quality of the library only, the first two screens contain the other main structural subsystems that form the total institutional system. The weights and values of these subsystems are assigned hypothetically and are the same for all the subject institutions. The institutional numeric indicators have been included to show the effect of the variances of the quality indicators of the libraries on the evaluation of the quality of the total institutions. The model is a menu-driven and user-friendly software and is accompanied by adequate documentation (Attachment 4). A basic knowledge of Lotus 1-2-3, however, would be helpful to the user.

Calculation of the Data

For illustrative purposes, the arithmetic means of the weights and values assigned to the components and subsystems were accepted as the intersubjective consensus of the subjects. The two sets of data reflecting the weights and values were, therefore, processed in the following manner. The weights (contribution/importance factors) were first averaged within the each institution to yield the institutional arithmetic means. These means were then averaged to yield a set of weights that were universal to community college libraries within the context of this study. These set of weights were then considered as the constant entity in the formula used to perform the calculation. On the other hand, the values, which were averaged within institution only, were institution-specific and constituted the variables. It should be noted that weights, despite being considered constants, vary based on the type of the institution, and should this study be extended to other types of institutions, e.g., four-year colleges or research universities, different sets of weights must be calculated and assigned.

At this point, it should be re-emphasized that the terms weight and value in the context of this study are merely labels assigned to contribution factors (constants), and condition (variables). Several studies are needed to identify the nature of weights (for example, whether they

are probabilistic or deterministic) and values (what conditions constitute 0.0 and 100) in the context of the Attributive Theory of Quality and establish the criteria and parameters for measuring them, especially as far as weights are concerned.

To calculate the interactive sum of the weights and values in the proposed model, the formula

S = ValA * WghtA + ValB * WghtB + . . . + ValN * WghtN

was considered appropriate and was adopted. This formula is, in essence, a linear equation used to depict the relationship between the objects and attributes (value and weights) in a system (Hall & Fagen, 1968). A system of linear equations formed the formula base for the proposed model.

The arithmetic means of the components and subsystems (Table 6), and the arithmetic means of the values of the components of each institution (Tables 1-5) were entered into the model which calculated the interactive sum of each set of subsystems at each level of the hierarchy (one linear equation) and assigned it to its respective subsystem at the next level. This process continued (a system of linear equations) until the sum of all the library subsystems was calculated and assigned to it. This sum (a numeric value between 0.0 and 100.00, both inclusive) indicated the perceived quality of the library at each community college (Table 7).

Also, since the model was constructed to represent the institution, to demonstrate the impact of each library on the total institution, the subsystems above the library in the institutional hierarchy were added to the model. The weights of these subsystems were assigned hypothetically, and their values were assigned at 100 as a control measure.

CHAPTER V
DATA ANALYSIS AND FINDINGS

In search of a solid theoretical basis and a conclusive definition for quality, an intensive search in the literature on quality and quality measurement was undertaken. The result was the understanding that neither a sound theory nor a valid definition for quality existed, particularly in relation to educational programs in higher education institutions. Hence, the primary objective of the study was to construct a theory and formulate a definition that would fill this void and meet the criteria of a valid theory and a practical definition.

The Attributive Theory of Quality, construing quality as an attribute rather than an entity, and the ensuing definition, describing quality as the interactive sum of all the necessary and sufficient properties of a phenomenon, were proposed by the author. This theory was subsequently evaluated against the commonly accepted criteria that establish the parameters for valid theories (Chapter II). This evaluation clearly demonstrated the validity of the Attributive Theory of Quality and its constructs and propositions. The definition clarified the direction for construction of an illustrative measurement model. The "interactive sum of all the . . . properties" implied a

systems approach to calculation. Consequently, a model based on a system of linear equations was created on Lotus 1-2-3 spreadsheet. This model was then tested with simulated data to verify its operational accuracy.

It was decided to test the model and verify the reliability of its results in a natural environment. Consequently, a multi-site data collection was conducted. The two sets of required data for the model, namely, the weights (percentage figures indicating the contribution factors) and the values (a number between 0.0 and 100 indicating the condition) of the subsystems and components of five community college libraries were collected from 15 librarians at five institutions. To this end, a data collection instrument to guide the interviews was developed by the author and site visits were arranged.

Concurrently, the evaluative views of a five-member panel of accreditation experts, who were recommended by the Southern Association of Colleges and Schools, were also solicited to provide the data for further verification. The descriptive profiles of the libraries involved in the study, which were presented to the panel members, are presented below. The outline of the profiles follows the format described by the Southern Association of Colleges and Schools. The same set of profiles was presented to each member of the panel of experts.

Library at Institution A

Services. This library occupies 25,000 sq. ft. to house its collections and services. Collections and service facilities are easily accessible. The library has an inter-library loan network and a computerized circulation system. It provides a comprehensive orientation program including in-class lectures in every term, updated library guides, formal instruction, user aid, and self-paced instruction (a two-hour session). The library is not equipped with computer-assisted instruction. The point-of-use services include personal assistance and traditional references in addition to catalogs, indexes, bibliographies, on-line access systems, and access to an external database, namely DIALOG. The library is equipped with copiers, on-line computer terminals, stand-alone computers, VCR's and TV monitors, over-head and slide projectors, change machine, and microfiche reader/printers. Except the microfiche equipment, the rest are relatively new and in good working condition.

Collections. The library houses about 76,000 volumes, 95% of which are directly in support of the curriculum, and the rest provide public service. A limited research activity is supported by the library. The library has an active development program and established policies and practices for ongoing selection and weeding of the collections.

Staff. The library is staffed with 6 professional staff with MLS degrees with an average experience of 10 years. The service points of the library (e.g., reference desk, circulation desk, etc.) are staffed at all times and service to students is uninterrupted. The staff consider their employment conditions in the top 10% nationally.

Institutional Relationship. The library has established procedures for professional relationship with a state research university and other institutions.

Off-campus Sites. The library supports its off-campus sites with one full-time and 2 part-time staff with comparable availability to the main campus. The material at sites support the courses offered at the locations. For other material, on-line access to the main library and delivery service to locations are available.

The weights (percentage figures) and the values (from 0.0 to 100) assigned to the components and subsystems of this library by the professional staff of the library and the arithmetic means of each set are presented in Table 1.

Library at Institution B

Services. This library occupies 35,500 sq. ft. to house its collections and services which are fully accessible (handicapped, etc.). The library has an inter-library loan network and but the circulation system is not computerized. It provides an orientation program that includes lectures as needed, updated library guides, formal

instruction (in the form of a course in catalog), and user aid. It has not established a self-paced instruction or computer-assisted instruction yet. The point-of-use services include personal assistance and traditional references in addition to catalogs, indexes, bibliographies, on-line access systems, and access to ERIC and DIALOG external databases. The library is equipped with on-line and stand-alone computers, VCR and TV monitors, over-head and slide projectors, change machine, and microfiche reader/printers. Overall, these items are about 80% operational any time. Except the microfiche equipment, the rest are relatively new and in good working condition.

Collections. The library houses about 222,000 volumes, 75% of which are directly in support of the curriculum, and the rest provide public service. A limited research activity is supported by the library. The development activities are part of the strategic planning and extensive selection and weeding is an ongoing process.

Staff. The library is staffed with 12 professional staff with MLS degrees with an average experience of 10-15 years. The service points of the library (e.g., reference desk, circulation desk, etc.) are staffed at all times and service to students is uninterrupted. The staff consider their employment conditions in the top 10% nationally.

Institutional Relationship. The library lacks an established and stable relationship with other institutions.

Off-campus Sites. The library supports its off-campus sites with one non-professional staff on an as-needed basis. The material at sites support only the courses offered at the locations. For other material, the students have to use the main library.

The weights (percentage figures) and the values (from 0.0 to 100) assigned to the components and subsystems of this library by the professional staff of the library and the arithmetic means of each set are presented in Table 2.

Library at Institution C

Services. This library occupies 30,000 sq. ft. to house its collections and services, both easily accessible to all including the handicapped. The library has an inter-library loan network and a computerized circulation system. It provides orientation programs including on-request lectures in the library instruction room, formal instruction, library guides (updated every 3 years, and user aid (Path-finder, handouts, etc.). Self-paced instruction and computer-assisted instructions are not available. The point-of-use services include personal assistance and traditional references in addition to catalogs, indexes, bibliographies, on-line access systems (library staff only), and access to DIALOG and OCLS external databases. The library is equipped with on-line computer terminals, copiers, VCR's and TV terminals, overhead and slide projectors, microfiche reader/printers, INFO Track, and News

Bank. The age of the equipment is 2-5 years, and all the items are in good working condition.

Collections. This library has about 100,000 volumes, 80% of which are directly in support of the curriculum, and the rest provide public service. Research activity is minimal. The library has a development program and selection and weeding are conducted annually.

Staff. The library is staffed with 5 professional staff with MLS degrees with an average experience of 15 years. The main service points of the library are staffed when the library is open. Employment condition is rated at the top 10%.

Institutional Relationship. The library has a de facto relationship with other institutions.

Off-campus Sites. The off-campus activity is not significant and the site is not staffed. The material in support of the courses only are provided as needed.

The weights (percentage figures) and the values (from 0.0 to 100) assigned to the components and subsystems of this library by the professional staff of the library and the arithmetic means of each set are presented in Table 3.

Library at Institution D

Services. This library occupies 76,000 sq. ft. to house its collections and services. Accessibility for the handicapped in the magazine section is partially limited. The library has an inter-library loan network, but the

circulation system is not computerized. The orientation program includes library tours and lectures, updated library guides (Pathfinder, handbooks), and user aid. Formal instruction, self-paced instruction, and computer-assisted instruction is not available. The point-of-use services include personal assistance and traditional references in addition to catalogs, indexes, bibliographies, on-line access systems, and access to an external database (DIALOG). The library is equipped with copiers, on-line and stand-alone computer terminals, VCR's and TV monitors, laser discs, over-head and slide projectors, and microfiche reader/printers, and change machines. The average age of the equipment 5 years and the items are generally in good working condition.

Collections. It has about 90,000 volumes, 80% of which are directly in support of the curriculum, and the rest provide public service. A limited research activity is supported by the library. The library has an established long- and short-term development program and policies and practices for ongoing selection and weeding of the collections. The weeding is conducted by discipline.

Staff. The library is staffed with 9 professional staff with MLS degrees with an average experience of 15 years. Two of the staff have special knowledge in physical education and A/V instructional technology. The service points of the library are staffed during the day. Student

assistants provide services during evening. The staff consider their employment conditions excellent Top 5%).

Institutional Relationship. The library has established procedures for professional relationship with several institutions in the region including Central Florida Consortium, OCLS and others.

Off-campus Sites. The off-campus site is not staffed. The library supports is provided through agreement with the local public library, computer access for magazine articles, and fax machines. The material supports courses only.

The weights (percentage figures) and the values (from 0.0 to 100) assigned to the components and subsystems of this library by the professional staff of the library and the arithmetic means of each set are presented in Table 4.

Library at Institution E

Services. This library occupies 31,500 sq. ft. to house its collections and services with problem-free accessibility. The library has an inter-library loan network and a computerized circulation system. The orientation program includes lectures in classes and writing workshops (on request), updated library guides, and user aid. It does not provide formal instruction, self-paced instruction, and computer-assisted instruction. The point-of-use services include personal assistance and traditional references in addition to catalogs, indexes, bibliographies, on-line access systems, and an external database (LUIS).

The library is equipped with copiers (1-2 years old), on-line computer terminals for catalog, microfilm reader/ printers (20-25 years old), CD RAM players and database for CD's. The equipment is overall in good working condition. The audio-visual unit is not part of the library.

Collections. It has about 90,000 volumes, 80% of which are directly in support of the curriculum, and the rest provide public service. A limited research activity is supported by the library. The development program is limited, weeding is conducted at random, and selection process is reasonably formalized.

Staff. The library is staffed with 8 professional staff (7 with MLS degrees) with an average experience of 13 years. The service points of the library (e.g., reference desk, circulation desk, etc.) are staffed at all times and service to students is uninterrupted. The staff consider their employment conditions in the top 5%.

Institutional Relationship. The library does not have a strong procedures for professional relationship with other academic institutions or libraries.

Off-campus Sites. The existing off-campus site is supported through the local public library in support of the courses only and is not staffed. The new site has no support.

The weights (percentage figures) and the values (form 0.0 to 100) assigned to the components and subsystems of

TABLE 1
TABULATION OF COMPONENT WEIGHTS AND VALUES
FOR INSTITUTION A

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
STAFF	30		30		20		27	
Professional Degree	20	100	30	80	40	100	30	93
Specialized Knowledge	30	75	10	30	15	75	18	60
Experience	35	75	30	60	15	90	27	75
Adequacy (Number)	5	75	20	50	10	80	12	68
Employment Condition	10	100	10	80	20	93	13	92
COLLECTIONS	30		30		15		25	
Development Activities	50	80	60	70	70	85	60	78
QUANTITY	40		20		10		23	
EDUCATIONAL SUPPORT	20		80		50		50	
Graduate	0	0	10	10	25	0	12	3
Undergraduate	100	90	90	90	75	90	88	90
RESEARCH SUPPORT	10		10		40		20	
Graduate	0	0	0	0	25	25	8	8
Undergraduate	100	100	100	70	75	90	92	87
Public Service	70	90	10	70	10	90	30	84
POLICIES	10		20		20		17	
Selection	75	50	50	80	80	90	68	73
Weeding	25	50	50	80	20	85	32	72
OFF-CAMPUS SITES	5		10		15		10	
Staff	50	85	40	80	20	75	36	80
Continuity/Availability	25	70	30	80	10	60	22	70
ADEQUACY	25		30		70		42	
Course	35	50	40	70	50	75	42	65
Program	30	50	30	70	25	60	28	60
Degree	35	50	30	70	25	70	30	63
INSTITUTIONAL RELATIONS	25		10		15		16	
Evaluation Programs	30	60	20	65	30	15	27	47
Safeguards for Integrity	50	80	10	70	30	15	30	53
Safeguards for Continuity	20	80	70	65	40	10	43	52
SERVICES	10		20		35		22	
Inter-Library Loans	10	100	10	85	10	85	10	90
Circulation System	10	100	20	85	10	90	13	92

TABLE 1--continued

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
EQUIPMENT	10		20		10		13	
Condition	60	50	40	75	25	10	41	45
Age	10	50	30	60	25	10	22	40
TYPE	30		30		50		37	
Print	50	100	50	80	35	30	45	70
Non-Print	30	60	25	70	40	60	32	63
Others	20	75	25	50	25	20	23	48
PHYSICAL FACILITIES	10		20		10		13	
SIZE	50		50		25		42	
For Collections	60	90	50	90	25	90	45	90
For Services	40	100	50	70	75	85	55	85
ACCESSIBILITY	50		50		75		58	
On-Hand Materials	100	100	95	90	80	95	92	95
Stored Materials	0	0	5	5	20	0	8	2
ORIENTATION PROGRAMS	40		10		30		26	
Lectures	20	70	20	70	20	85	20	75
Library Guides	10	65	10	70	15	85	12	73
Formal Instruction	30	90	40	80	20	90	30	87
User Aid	20	80	10	60	25	90	18	77
Self-Paced Instruction	20	75	10	60	5	90	12	75
Computer-Assisted Inst	0	0	10	30	15	65	8	32
POINT-OF-USE INSTRUCTION	20		20		30		24	
Traditional Reference	20	100	40	80	35	75	32	85
Personal Assistance	50	100	40	80	40	90	43	90
RECORDS OF MATERIALS	30		20		25		25	
Catalogs	20	80	10	70	10	100	13	83
Indexes	25	80	10	80	15	75	17	78
Bibliographies	10	80	10	70	15	80	12	77
On-line Systems	30	60	60	80	30	75	40	72
External Databases	15	100	10	70	30	75	18	82

TABLE 2
TABULATION OF COMPONENT WEIGHTS AND VALUES
FOR INSTITUTION B

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
STAFF	40		20		35		31	
Professional Degree	20	100	30	80	40	100	30	93
Specialized Knowledge	15	60	20	70	20	40	18	57
Experience	15	75	20	80	10	100	15	85
Adequacy (Number)	40	75	15	70	20	60	25	68
Employment Condition	10	90	15	80	10	100	12	90
COLLECTIONS	30		25		35		30	
Development Activities	70	80	20	70	40	50	43	67
QUANTITY	20		40		50		37	
EDUCATIONAL SUPPORT	70		50		70		63	
Graduate	5	50	20	90	0	0	8	47
Undergraduate	95	80	80	70	100	100	92	83
RESEARCH SUPPORT	10		25		10		15	
Graduate	5	30	30	70	0	0	12	33
Undergraduate	95	85	70	90	100	100	88	92
Public Service	20	75	25	80	20	40	22	65
POLICIES	10		40		10		20	
Selection	60	75	70	80	70	70	67	75
Weeding	40	60	30	60	30	50	33	57
OFF-CAMPUS SITES	10		15		10		12	
Staff	40	20	25	20	50	25	38	22
Continuity/Availability	30	20	25	20	30	20	28	20
ADEQUACY	30		50		20		34	
Course	80	30	50	30	20	20	50	27
Program	10	20	30	30	50	50	30	33
Degree	10	30	20	40	30	30	20	33
INSTITUTIONAL RELATIONS	10		15		10		12	
Evaluation Programs	70	75	30	60	30	40	44	58
Safeguards for Integrity	15	25	35	70	35	45	28	47
Safeguards for Continuity	15	25	35	5	35	45	28	35
SERVICES	10		25		10		15	
Inter-Library Loans	5	80	20	95	10	70	11	82
Circulation System	15	70	20	60	10	75	15	68

TABLE 2-- continued

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
EQUIPMENT	20		10		20		17	
Condition	35	75	60	60	34	40	43	58
Age	30	50	20	70	33	35	28	52
TYPE	35		20		33		29	
Print	40	75	65	80	40	60	48	72
Non-Print	40	75	30	80	40	35	37	63
Others	20	50	5	70	20	40	15	53
PHYSICAL FACILITIES	30		10		20		20	
SIZE	60		50		50		53	
For Collections	60	75	50	70	60	40	57	62
For Services	40	60	50	80	40	35	43	58
ACCESSIBILITY	40		50		50		47	
On-Hand Materials	80	80	70	80	100	100	83	87
Stored Materials	20	80	30	90	0	0	17	57
ORIENTATION PROGRAMS	15		15		20		17	
Lectures	20	65	5	90	10	30	12	62
Library Guides	20	60	5	80	10	25	12	55
Formal Instruction	20	80	40	80	20	10	27	57
User Aid	10	10	15	70	20	20	15	33
Self-Paced Instruction	15	25	20	70	20	0	18	32
Computer-Assisted Inst	15	10	15	20	20	0	16	10
POINT-OF-USE INSTRUCTION	15		25		20		20	
Traditional Reference	30	75	30	90	30	50	30	72
Personal Assistance	40	75	40	90	30	50	37	72
RECORDS OF MATERIALS	30		30		40		33	
Catalogs	25	80	20	80	20	40	22	67
Indexes	25	75	20	70	30	30	25	58
Bibliographies	15	50	20	70	5	5	13	42
On-line Systems	25	0	20	20	30	15	25	12
External Databases	10	10	20	50	15	10	15	23

TABLE 3
TABULATION OF COMPONENT WEIGHTS AND VALUES
FOR INSTITUTION C

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
STAFF	40		20		20		27	
Professional Degree	20	100	10	100	20	60	17	87
Specialized Knowledge	5	95	5	20	20	10	10	42
Experience	30	100	10	50	20	30	20	60
Adequacy (Number)	5	85	60	100	20	100	28	95
Employment Condition	40	65	15	50	20	90	25	68
COLLECTIONS	20		20		20		20	
Development Activities	50	100	10	10	40	40	33	50
QUANTITY	40		80		20		47	
EDUCATIONAL SUPPORT	85		20		40		48	
Graduate	5	95	2	5	20	40	9	47
Undergraduate	95	100	98	95	80	60	91	85
RESEARCH SUPPORT	5		5		20		10	
Graduate	5	90	2	5	20	40	9	45
Undergraduate	95	100	98	95	80	60	91	85
Public Service	10	90	75	95	40	20	42	68
POLICIES	10		10		40		20	
Selection	85	100	50	100	50	50	62	84
Weeding	15	100	50	100	50	50	38	84
OFF-CAMPUS SITES	1		5		20		9	
Staff	10	85	20	100	34	60	21	82
Continuity/Availability	5	85	15	80	33	40	18	68
ADEQUACY	85		65		33		61	
Course	34	90	34	25	34	34	34	34
Program	33	90	33	25	33	33	33	33
Degree	33	90	33	25	33	33	33	33
INSTITUTIONAL RELATIONS	9		5		20		11	
Evaluation Programs	34	85	50	80	34	25	40	64
Safeguards for Integrity	33	85	25	80	33	70	30	78
Safeguards for Continuity	33	85	25	80	33	05	30	57
SERVICES	30		50		20		33	
Inter-Library Loans	5	100	10	80	10	50	8	77
Circulation System	5	85	50	90	10	50	21	75

TABLE 3-- continued

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
EQUIPMENT	5		10		20		12	
Condition	20	50	80	80	34	50	45	60
Age	20	50	10	10	33	50	21	37
TYPE	60		10		33		34	
Print	50	90	80	80	40	80	56	83
Non-Print	45	95	19	80	40	15	35	63
Others	5	90	1	50	20	5	9	48
PHYSICAL FACILITIES	5		10		20		12	
SIZE	15		50		50		38	
For Collections	50	85	50	80	20	50	40	72
For Services	50	95	50	80	80	50	60	75
ACCESSIBILITY	85		50		50		62	
On-Hand Materials	75	90	100	100	80	80	85	85
Stored Materials	25	35	0	0	20	20	15	25
ORIENTATION PROGRAMS	35		10		20		22	
Lectures	10	80	0	0	10	15	7	32
Library Guides	10	80	5	80	20	15	12	58
Formal Instruction	20	70	80	80	20	30	40	60
User Aid	20	100	5	80	20	10	15	63
Self-Paced Instruction	20	95	5	20	10	10	11	42
Computer-Assisted Inst	20	90	5	50	20	10	15	50
POINT-OF-USE INSTRUCTION	45		10		20		25	
Traditional Reference	40	90	25	75	34	50	33	72
Personal Assistance	50	100	25	75	33	50	36	75
RECORDS OF MATERIALS	10		50		33		31	
Catalogs	10	100	30	90	20	40	20	77
Indexes	5	100	20	90	20	30	15	73
Bibliographies	5	75	10	20	20	10	12	35
On-line Systems	40	80	30	90	20	14	30	61
External Databases	40	80	10	50	20	06	23	77

TABLE 4
TABULATION OF COMPONENT WEIGHTS AND VALUES
FOR INSTITUTION D

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
STAFF	30		20		20		23	
Professional Degree	10	100	20	100	30	100	20	100
Specialized Knowledge	10	40	15	60	10	50	12	50
Experience	30	100	20	100	20	100	23	100
Adequacy (Number)	30	60	30	70	25	60	28	63
Employment Condition	20	90	15	100	15	80	17	90
COLLECTIONS	30		30		30		30	
Development Activities	25	60	10	80	40	65	25	68
QUANTITY	60		75		40		58	
EDUCATIONAL SUPPORT	50		80		80		70	
Graduate	5	90	0	0	10	90	5	60
Undergraduate	95	70	100	85	90	70	95	75
RESEARCH SUPPORT	10		10		15		12	
Graduate	10	50	0	0	20	20	10	23
Undergraduate	90	70	100	85	80	60	92	72
Public Service	40	40	10	20	5	90	18	50
POLICIES	15		15		20		17	
Selection	50	80	80	80	80	85	70	82
Weeding	50	70	20	100	20	90	30	87
OFF-CAMPUS SITES	5		5		5		5	
Staff	40	10	20	0	30	0	30	3
Continuity/Availability	50	50	20	10	30	0	33	20
ADEQUACY	10		60		40		37	
Course	50	40	34	25	20	0	34	22
Program	30	40	33	25	50	0	28	22
Degree	20	40	33	25	30	0	38	22
INSTITUTIONAL RELATIONS	5		15		15		12	
Evaluation Programs	40	30	20	80	30	70	30	60
Safeguards for Integrity	30	20	60	80	40	60	43	53
Safeguards for Continuity	30	20	20	80	30	50	27	50
SERVICES	30		30		30		30	
Inter-Library Loans	20	80	15	100	15	100	17	93
Circulation System	10	40	5	50	15	85	10	58

TABLE 4-- continued

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
EQUIPMENT	10		20		10		13	
Condition	30	50	33	50	35	50	33	50
Age	30	40	33	50	30	50	31	47
TYPE	40		34		35		36	
Print	50	70	50	70	45	60	48	67
Non-Print	30	40	30	50	45	50	35	47
Others	20	40	20	70	10	55	17	55
PHYSICAL FACILITIES	10		10		10		10	
SIZE	40		30		40		37	
For Collections	40	90	40	70	50	90	43	83
For Services	60	90	60	100	50	90	57	93
ACCESSIBILITY	60		70		60		63	
On-Hand Materials	90	100	90	80	90	70	90	83
Stored Materials	10	0	10	20	10	50	10	23
ORIENTATION PROGRAMS	20		30		25		25	
Lectures	20	90	25	100	10	80	18	90
Library Guides	30	90	25	100	25	80	27	90
Formal Instruction	10	10	25	100	25	40	20	50
User Aid	20	90	25	100	25	80	23	90
Self-Paced Instruction	10	0	0	0	10	10	7	3
Computer-Assisted Inst	10	0	0	0	5	5	5	2
POINT-OF-USE INSTRUCTION	30		20		25		25	
Traditional Reference	30	80	40	100	30	75	33	85
Personal Assistance	40	80	40	100	30	65	37	82
RECORDS OF MATERIALS	30		20		40		30	
Catalogs	40	70	30	100	20	80	30	83
Indexes	30	40	30	100	20	70	27	70
Bibliographies	10	60	20	100	10	65	13	75
On-line Systems	10	60	10	100	30	80	17	80
External Databases	10	40	10	100	20	60	13	67

TABLE 5
TABULATION OF COMPONENT WEIGHTS AND VALUES
FOR INSTITUTION E

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
STAFF	40		40		30		37	
Professional Degree	50	90	25	80	40	100	38	90
Specialized Knowledge	5	10	50	80	10	90	22	60
Experience	30	90	15	70	20	90	22	83
Adequacy (Number)	5	90	5	75	20	100	10	88
Employment Condition	10	25	5	60	10	100	8	62
COLLECTIONS	25		30		30		28	
Development Activities	10	50	30	80	50	40	30	82
QUANTITY	40		20		25		28	
EDUCATIONAL SUPPORT	40		75		50		55	
Graduate	10	50	0	5	0	0	3	18
Undergraduate	90	50	100	100	100	100	97	83
RESEARCH SUPPORT	10		20		10		13	
Graduate	10	10	5	15	2	25	5	17
Undergraduate	90	25	95	80	98	100	95	68
Public Service	50	100	5	50	40	100	32	83
POLICIES	50		50		25		42	
Selection	50	30	75	50	55	50	60	43
Weeding	50	50	25	30	45	60	40	47
OFF-CAMPUS SITES	10		2		2		5	
Staff	15	50	40	50	34	40	30	67
Continuity/Availability	10	10	40	45	33	50	28	35
ADEQUACY	75		20		33		42	
Course	15	80	45	75	34	60	31	72
Program	15	50	45	40	33	30	31	40
Degree	70	500	10	45	33	55	38	50
INSTITUTIONAL RELATIONS	5		10		8		8	
Evaluation Programs	60	60	34	55	10	50	35	55
Safeguards for Integrity	25	25	33	75	45	75	34	58
Safeguards for Continuity	15	10	33	60	45	55	31	42
SERVICES	20		18		30		22	
Inter-Library Loans	10	100	10	95	15	80	12	92
Circulation System	15	25	10	95	20	100	15	73

TABLE 5--continued

WEIGHTS/VALUES	SUB 1		SUB 2		SUB 3		MEAN	MEAN
COMPONENTS	W	V	W	V	W	V	WGHT	VAL
EQUIPMENT	40		10		16		22	
Condition	50	100	75	75	40	100	55	92
Age	10	50	5	50	50	60	22	53
TYPE	40		20		10		23	
Print	80	100	10	50	45	100	45	83
Non-Print	10	20	40	70	45	60	32	50
Others	10	40	50	90	10	80	23	70
PHYSICAL FACILITIES	10		15		16		14	
SIZE	50		60		45		52	
For Collections	50	100	50	100	50	100	50	100
For Services	50	100	50	100	50	100	50	100
ACCESSIBILITY	50		40		55		48	
On-Hand Materials	90	100	95	100	75	100	87	100
Stored Materials	10	10	5	60	25	25	13	32
ORIENTATION PROGRAMS	0		5		16		7	
Lectures	10	10	5	20	20	90	12	40
Library Guides	20	50	5	30	25	100	17	60
Formal Instruction	30	50	25	50	20	90	25	63
User Aid	20	100	45	90	20	100	28	97
Self-Paced Instruction	10	50	10	65	5	100	8	72
Computer-Assisted Inst	10	10	10	65	10	100	10	58
POINT-OF-USE INSTRUCTION	25		50		17		30	
Traditional Reference	40	100	25	80	35	100	33	93
Personal Assistance	40	100	50	100	35	100	42	100
RECORDS OF MATERIALS	20		25		30		25	
Catalogs	30	20	20	90	5	100	18	70
Indexes	20	100	30	90	25	100	25	97
Bibliographies	5	10	10	50	15	90	10	50
On-line Systems	30	75	20	85	50	100	33	87
External Databases	15	100	20	90	5	100	14	97

this library by the professional staff of the library and the arithmetic means of each set are presented in Table 5.

To represent the intersubjective concurrence of the experts, the mean weights of the components and subsystems and the mean values of the components of each library were calculated (Tables 1-5). Each table contains the subsystems and components of the library in a higher education institution, with the components grouped under their respective subsystems. The weights (for all the subsystems and components) and the values (for components only) assigned by the subjects (professional staff) at each location are also included. Finally, the arithmetic means of the weights and values of the subsystems and components are presented. To obtain a set of weights applicable to the community college libraries (in the context of this study), the arithmetic means of the weights of the subsystems and components of the 5 libraries were averaged. In Table 6, the arithmetic means of the weights of the subsystems and components of each of the libraries (drawn from Tables 1-5) and their respective arithmetic means are presented. These new figures reflect the consensus of the experts as to the weights that should universally be assigned to the subsystems and components of the libraries in community colleges in this study.

With weights being constant among the libraries, each library's mean values, therefore, became the variables that

TABLE 6
TABULATION OF INTER-INSTITUTIONAL WEIGHTS
ASSIGNED TO COMMUNITY COLLEGE LIBRARIES

WEIGHTS / COMPONENTS	INST A	INST B	INST C	INST D	INST E	MEAN WGHT
STAFF	27	31	27	23	37	29
Professional Degree	30	30	17	20	38	27
Specialized Knowledge	18	18	10	12	22	16
Experience	27	15	20	23	22	21
Adequacy (Number)	12	25	28	28	10	21
Employment Condition	13	12	25	17	8	15
COLLECTIONS	25	30	20	30	28	27
Development Activities	60	43	33	25	30	38
QUANTITY	23	37	47	58	28	39
EDUCATIONAL SUPPORT	50	63	48	70	55	57
Graduate	12	8	9	5	3	7
Undergraduate	88	92	91	95	97	93
RESEARCH SUPPORT	20	15	10	12	13	14
Graduate	8	12	9	10	5	9
Undergraduate	92	88	91	90	95	91
Public Service	30	22	42	18	32	29
POLICIES	17	20	20	17	42	23
Selection	68	67	62	70	60	65
Weeding	32	33	38	30	40	35
OFF-CAMPUS SITES	10	12	9	5	5	8
Staff	36	38	21	30	30	31
Continuity/Availability	22	28	18	33	28	26
ADEQUACY	42	34	61	37	42	43
Course	42	50	34	34	31	38
Program	28	30	33	28	31	30
Degree	30	20	33	38	38	32
INSTITUTIONAL RELATIONS	16	12	11	12	8	12
Evaluation Programs	27	44	40	30	35	35
Safeguards for Integrity	30	28	30	43	34	33
Safeguards for Continuity	43	28	30	27	31	32
SERVICES	22	15	33	30	22	24
Inter-Library Loans	10	11	8	17	12	12
Circulation System	13	15	21	10	15	15

TABLE 6--continued

COMPONENTS / WEIGHTS	INST A	INST B	INST C	INST D	INST E	MEAN WGHT
EQUIPMENT	13	17	12	13	22	15
Condition	41	43	45	33	55	43
Age	22	28	21	31	22	25
TYPE	37	29	34	36	23	32
Print	45	48	56	48	45	49
Non-Print	32	37	35	35	32	34
Others	23	15	9	17	23	17
PHYSICAL FACILITIES	13	20	12	10	14	14
SIZE	42	53	38	37	52	44
For Collections	45	57	40	43	50	47
For Services	55	43	60	57	50	53
ACCESSIBILITY	58	47	62	63	48	56
On-Hand Materials	92	83	85	90	87	87
Stored Materials	8	17	15	10	13	13
ORIENTATION PROGRAMS	27	17	22	25	7	19
Lectures	20	12	7	18	12	14
Library Guides	12	12	12	27	17	16
Formal Instruction	30	27	40	20	25	28
User Aid	18	15	15	23	28	20
Self-Paced Instruction	12	18	11	7	8	11
Computer-Assisted Inst	8	16	15	5	10	11
POINT-OF-USE INSTRUCTION	24	20	25	25	30	25
Traditional Reference	32	30	33	33	33	32
Personal Assistance	43	37	36	37	42	39
RECORDS OF MATERIALS	25	33	31	30	25	29
Catalogs	13	22	20	30	18	21
Indexes	17	25	15	27	25	22
Bibliographies	12	13	12	13	10	12
On-line Systems	40	25	30	17	33	29
External Databases	18	15	23	13	14	16

would signify the differences in the perceived quality. Table 7 presents the results of the calculations by the model, namely, the quality indicators (interactive sums of the properties) of the five libraries and their rank order, in addition to their effect on their respective institutions. Table 8 contains the numeric indicators of quality (overall values) assigned to each library by each of the members of the panel of expert, the arithmetic means of values for each library, and their rank order. Table 9 presents the comparison of the two sets of results for verification purposes. The analysis of the data in Table 9 indicates that both sets of data (numeric values and rank orders) validate the theory and verify the results of the model. Specifically, for each library, the difference in numeric values (generated by the model and the panel) is less than 10% of each of the values, and the rank orders based on the two sets of the results are identical. Such similarity in results is the proof of the validity of the Attributive Theory of Quality and utility of its measurement model.

TABLE 7
LIBRARY AND INSTITUTIONAL VALUES AND
INSTITUTIONAL RANKING AS CALCULATED BY THE ATQ MODEL

RESULTS INSTITUTION	LIBRARY VALUE CALCULATED BY THE MODEL	INSTITUTIONAL VALUE (BY THE MODEL)	RANK
Institution A	76.38	96.57	1
Institution B	65.94	95.32	4
Institution C	67.53	95.54	2
Institution D	67.26	95.50	3
Institution E	64.33	95.10	5

TABLE 8
LIBRARY AND INSTITUTIONAL VALUES AND
INSTITUTIONAL RANKING AS CALCULATED BY THE ATQ MODEL

PANEL RESULTS INSTITUTION	MEM-BER 1	MEM-BER 2	MEM-BER 3	MEM-BER 4	MEM-BER 5	MEAN VALUE	RANK
Institution A	80	78	70	85	90	80.60	1
Institution B	60	67	65	80	58	66.00	4
Institution C	70	70	75	75	75	73.00	2
Institution D	85	64	60	80	75	72.80	3
Institution E	75	56	55	70	50	61.20	5

TABLE 9
COMPARISON OF THE RESULTS FROM THE ATQ MODEL
AND THE SACS PANEL OF EXPERTS

RESULTS / INSTITUTION	LIBRARY VALUE (MODEL)	LIBRARY VALUE (SACS)	RANK BY (MODEL)	RANK BY (SACS)
Institution A	76.38	80.60	1	1
Institution B	65.94	66.00	4	4
Institution C	67.53	73.00	2	2
Institution D	67.26	72.80	3	3
Institution E	64.33	61.2	5	5

CHAPTER VI
CONCLUSIONS AND RECOMMENDATIONS

Through theory development, the purpose of this study was to clarify the prevailing misconceptions and confusions over quality in general, and educational quality in particular. An historical review and analysis of the literature demonstrated the absence of systematic and scientific approach in the research and study of quality. Over-reliance on inadequate evaluative criteria, mostly based on inaccurate definitions of quality, has also led to an abundance of inconclusive and misleading reports in this important area of American higher education.

As evident from the study, the theoretical basis of the study, namely the Attributive Theory of Quality presents a realistic and comprehensive approach to definition and measurement of quality. The interactive nature of the theory utilizes a systems methodology, and the proposed illustrative measurement model, being mathematical in concept, can produce accurate and concrete results. An intersubjective approach to data collection and analysis requiring participation by experts is recommended. In this approach, experts, e.g., the professional staff of the libraries, are asked to provide the required data for analysis. The illustrative measurement of quality of 5

community college libraries in this study, revealed that this approach produces highly reliable data.

The philosophical orientation and practical approach of this study have serious implications for the various sectors of higher educational system. Some of these implications have a higher degree of urgency and require immediate attention:

1. The proposed model, when fully developed, should be used in institutional evaluation processes, specifically accreditation, to arrive at accurate and comprehensive results, or at the very least confirm and validate the outcomes of other evaluation methodologies.
2. Current information on the type, parts and relationships of the parts of higher education institutions is inadequate. Efforts to develop a comprehensive database to secure such data are essential.
3. Rankings, if done at all, should be done only on institutions of the same type and mission.
4. A "total systems" approach to evaluation of educational institutions should be adopted.
5. Well-defined and relevant criteria as well as the parameters for measuring the weights and values of components and subsystems of educational institutions should be developed.

Recommendations for Further Research

Based on the aforementioned recommendations, the following studies are suggested:

1. Studies to determine the characteristics of the different types of higher education institutions in America should be undertaken so that a realistic and comprehensive classification of these institutions would be available.
2. System analysis to identify the subsystems and components of the different types of institutions must be conducted.
3. Studies to define the nature, establish the parameter, and determine the accepted weights of the subsystems and components in different types of institutions are necessary.
5. Studies to determine the value parameters (0.0 and 100) of each of the components of the higher education institutions are needed.

Limitations of the Study

There are several limitations in this study that should be noted. First, although the theory was formulated to encompass a complete system, e.g., a total institution, the model was applied only to one segment of the institution, the library, because the purpose of the model was illustration, and application of the model to a total institution will require several major independent studies.

To elaborate, the study has been limited to illustrating the process of applying the Attributive Theory of Quality to quality measurement in institutions of higher education by applying it one segment of the institution, namely, the library. Specifically, the study, the methodology, the instrumentation, and the measurement model have been designed based on the parameters and the data pertaining to the library. The measurement model, in particular, is a prototype that merely demonstrates the data calculation process as related to the library, and should not be construed as a product with general applicability.

Also, this study was not designed to test the parsimony and the internal consistency of the model. Testing these aspects of the Attributive Theory of Quality is only possible with the data obtained from studies recommended in this chapter. Finally, data analysis did not encompass any assessment of the interreliability of the ratings provided by the participants in the study, that is, the members of the expert panel and the professional staff of the libraries.

APPENDIX A
TEXTUAL DESCRIPTION OF THE LIBRARY IN AN INSTITUTION OF HIGHER EDUCATION

As reflected in the Criteria for accreditation (pp. 30-32) by SACS (1988).

Educational Support Services

Each institution must provide a variety of services that support its educational purposes. These support services include the library; instructional support services; computer services; and those services that complement the educational, social, moral and physical development of the student. This requirement applies to all programs wherever they are located or however they are delivered.

Library

Library resources and services are essential to learning. Each institution must ensure that all students and faculty have access to the primary and secondary materials needed to support its purposes and programs. These resources should be available in a well-equipped, readily accessibly facility of adequate size which encourages maximum use by the campus community. To facilitate use of such resources, a competent staff must be available to assist the users. The collections of print and

non-print materials must be well organized, and adequate hours must be maintained to ensure accessibility to users.

Priorities for acquiring materials and establishing services must be determined with the needs of the users in mind. Thus, with the active cooperation of the administration, faculty, students and library staff, each institution must develop for its library a mission statement consistent with the institutional purpose. The library must be evaluated regularly and systematically to ensure that it is meeting the needs of its users and supporting the programs and purpose of the institution.

Services

Basic library services must include an orientation program designed to teach new users how to obtain individual assistance, access to bibliographic information, and access to materials. Any one of a variety of methods, or a combination of them, may be used for this purpose: formal instruction, lectures, library guides and user aids, self-paced instruction and computer-assisted instruction.

The library should offer point-of-use instruction, personal assistance in conducting library research and traditional reference services. Professional assistance should be available at convenient locations when the library is open.

The library must provide adequate record of materials through catalogs, indexes and bibliographies, access of

information sources, regardless of location, through standard indexes and bibliographies; and, where appropriate, access to external bibliographic data bases.

The library must have adequate physical facilities to house, service and make the library collections easily available; up-to date equipment in good condition for using print and non-print materials; provision for rapid access to any remotely stored materials; provision for interlibrary loan agreements; and an efficient and appropriate circulation system. The library must provide students with opportunities to learn how to access information in a variety of formats so that they can continue life-long learning. Librarians must work cooperatively with the teaching faculty in assisting to use resource materials effectively.

Collections

The library collections and data bases must be sufficient to support the educational, research and public service programs of the institution. Institutions offering graduate work must provide library resources substantially beyond those required for the bachelor's degree. Librarians, teaching faculty and researchers must share in the development of collections and the institution must establish policies defining their involvement. Each library must have a policy governing the principles of selection and weeding.

Staff

The library must be adequately staffed by professional librarians who hold professional degrees at the graduate level in library science or learning resources. Since professional or technical training in specialized areas is increasingly important in meeting user needs, professionals with specialized non-library degrees may be employed, where appropriate, to supervise these areas.

The library support staff must be adequate to carry out the responsibilities of a technical nature. Qualifications (skills needed) for these support positions should be defined by the institution.

The chief librarian must be a well-qualified professional whose administration of library services contributes to the educational effectiveness of the institution. Organizational relationships, both external and internal to the library, should be clearly specified. Institutional policies concerning faculty status, salary and contractual security for library personnel must be clearly defined and made known to all personnel at the time of employment.

Institutional Relationships

In order to increase the ability of the library to provide the resources and services needed by its users, cooperative relationships with the other libraries and agencies should be considered. However, these cooperative

relationships must not be used by institutions to avoid responsibility for providing their own adequate and accessible library resources and services. In all cases of cooperative arrangements, formal agreements must be established, thereby safeguarding the integrity and continuity of library resources and services. The effectiveness of such cooperative arrangements must be evaluated regularly.

Library Resources at Off-Campus Sites

At any off-campus location where credit courses are offered, an institution must ensure the provision of and access to adequate learning resources and services required to support the courses, programs and degrees offered. The institution must own the learning resources or provide them through formal agreements. Competent library personnel must be assigned duties in planning and providing library resources and services and in ascertaining their continued adequacy.

When formal agreements are established for the provision of library resources and services, they must ensure access to library resources pertinent to the programs offered by the institution and must include provision for services and resources which support the institution's specific programs, in the field of study and at the degree level offered.

APPENDIX B
A CLASSIFICATION OF INSTITUTIONS OF HIGHER EDUCATION

By the Carnegie Foundation for the Advancement of Teaching (1987).

The Carnegie Classification of higher education groups American colleges and universities on the basis of their missions and educational functions. This classification was developed in 1973 by Dr. Clark Kerr primarily to improve the precision of the Carnegie Commission's research. A second edition appeared in 1976. Over the years, the system has gained credibility and served as a helpful guide to scholars and researchers.

Higher education is ever changing, and new institutional adjustments may, in the future, require changes in our classifications. However, this 1987 edition holds to the basic categories as defined by Dr. Kerr. By keeping the definitions relatively constant, we are able to portray changes in higher education that have occurred in the intervening years.

Perhaps the most consequential trend in this report is the continued growth of the nation's higher learning institutions. Since 1976, overall student enrollment has increased 10 percent. The largest growth has been in the

two-year colleges (14 percent). The community college movement, which has contributed so uniquely to the nation, continues to be especially responsive to adults engaged in lifelong learning.

Among the four-year institutions, the enrollment increase in private higher education (13 percent) has been more than double the growth in the public sector (6 percent). We note with satisfaction that America's independent colleges have shown remarkable resiliency during a period when many observers were predicting their decline.

We also found that during a decade called the "era of retrenchment," 484 new colleges have been launched. Of these, 314 are community, junior and technical colleges and 147 are specialized institutions. Sixteen are liberal arts colleges and one new institution offers the doctorate degree. This growth was offset somewhat by the 167 institutions that merged, closed, or otherwise were no longer qualified for inclusion in the listing. Still, the net gain was 317.

The latest Carnegie profile also reveals what some have called in higher education an "upward drift." For example, there has been, since 1976, an increase in the number of universities classified as Research and Doctorate-Granting. Significantly, the growth was greater in the private than the public sector.

At the same time, we found a small decline in the number of liberal arts colleges. In the 1976 report, there were 583 such institutions; in 1987 the number is 571. Many of the Liberal Arts II colleges have been reclassified as Comprehensive, and many more, while continuing to be classified as liberal arts, have changed missions by expanding their vocational and professional offerings.

Also reflecting the trend toward occupational training is the growth in the number of Specialized institutions - from 559 in 1976 to 643 today. This expansion reflects many new colleges that offer programs in such fields as business, engineering, and technology. There has been a strong surge in religious studies, too.

Here an important caveat should be noted. While the overall number of liberal arts colleges declined, those classified as Liberal Arts I--highly selective institutions that offer over half of their degrees in arts and science fields--have increased from 123 to 142. Further, overall enrollment at these institutions has gone up from 154,000 to 191,000. All of this suggests that colleges with a strong liberal arts tradition and with great pulling power have not made major curriculum adjustments in response to market place demands.

Significantly, a new subcategory, Corporate Education, has been added to the Carnegie classification. Twenty-two accredited degree-granting institutions operating within

industry and business are so designated. At the same time, we have dropped a previously existing category, Institutions for Nontraditional Study.

In summary, this latest classification reveals a healthy and expanding network of higher learning institutions in the nation. Voices of gloom and predictions of decline are not supported by the trends. Americans, perhaps as never before, believe in our system of higher education, one that is closely tied to the economic and social vitality of the nation and to the private hopes of students and their families. Colleges and universities in the United States have an amazing capacity to respond creatively to new conditions and to continually adapt. This system, accomplished without a national "master plan," is one of our most remarkable achievements.

We also note with satisfaction that diversity is alive and well. For example, the balance between the private and public sectors has, since 1976, remained relatively constant and, in spite of earlier trends and dark predictions, the independent colleges in America have shown resiliency and growth. We urge the public policy continue to acknowledge the contributions of both sectors.

Of special interest is the continuing expansion of Research and doctorate-Granting institutions. But our concern is that quality be maintained. America must continue to support a core of world-class research centers

which are essential to the advancement of knowledge and to human achievement, too. But such activity is costly, and it is crucial that we have available the fiscal as well as human resources needed to sustain an expanding network of institutions devoted to scholarly research.

One of the most fascinating trends of the past decade has been the shift of liberal arts colleges to the category called Comprehensive. This change reflects, in some measure, an imaginative strategy to meet the vocational needs of students. Still, a balance must be struck. There is, within the tradition of the liberal arts, a commitment to the intellectual quest, the use of reason, and respect for values unrelated to market demands. These "internal imperatives" that greatly enrich the career interests of students must also be sustained and strengthened.

We find it significant that a new category, Corporate Education, has been added. Business-based education is, today, one of the fastest growing sectors, offering students accredited degrees. While established colleges have much to learn from the corporate classroom, the danger is that, in a bid for survival, colleges and universities will seek to imitate corporate education. If that happens, traditional higher education, having abandoned its own special mission, will find itself in a contest it cannot win.

Finally, it should be a cause for concern that we have so few colleges that are unapologetically experimental.

After World War II there was a network of nontraditional institutions in this nation, colleges that had prestige among peers and took pride in their educational innovations. Today that network has largely disappeared. Educators speak often of diversity within the academy, but it is also true that when it comes to standards and procedures that rules from campus to campus are pretty much the same. Without sacrificing academic excellence there is, we feel, an important place for institutions that introduce new strategies and test creatively new assumptions.

One final point. This classification of colleges and universities is not intended to establish a hierarchy among higher learning institutions. Rather, the aim is to group institutions according to their shared characteristics, and we oppose the use of the classification as a way of making qualitative distinctions among the separate sectors. We have in this country a rich array of institutions that serves a variety of needs. We celebrate the diversity, acknowledging that our system of higher education is the envy of the world. Indeed, America's network of colleges and universities is strong precisely because we have avoided a unitary model, and, in the days ahead, our goal must be continuously to promote both excellence and diversity in higher education.

Definitions

The 1987 Carnegie classification includes all colleges and universities in the United States listed in the 1985-86 Higher Education General Information Survey of Institutional Characteristics. It groups institutions into categories on the basis of the level of degree offered - ranging from prebaccalaureate to the doctorate-and the comprehensiveness of their missions. The categories are as follows:

Research Universities I: These institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research. They receive annually at least $33.5 million in federal support and award at least 50 Ph.D. degrees each year.

Research Universities II: These institutions offer a full range of baccalaureate programs, are committed to graduate education through the doctorate degree, and give high priority to research. They receive annually between $12.5 million and $33.5 million in federal support for research and development and award at least 50 Ph.D. degrees each year.

Doctorate-Granting Universities I: In addition to offering a full range of baccalaureate programs, the mission of these institutions includes a commitment to graduate education through the doctorate degree. They award at least 40 Ph.D. degrees annually in five or more academic disciplines.

Doctorate-Granting Universities II: In addition to offering a full range of baccalaureate programs, the mission of these institutions includes a commitment to graduate education through the doctorate degree. They award annually 20 or more Ph.D. degrees in at least one discipline or 10 or more Ph.D. degrees in three or more disciplines.

Comprehensive Universities and Colleges I: These institutions offer baccalaureate programs and, with few exceptions, graduate education through the masters degree. More than half of their baccalaureate degrees are awarded in two or more occupational or professional disciplines such as engineering or business administration. All of the institutions in this group enroll at least 2,500 students.

Comprehensive Universities and Colleges II: These institutions award more than half of their baccalaureate degrees in two or more occupational or professional disciplines, such as engineering or business administration, and many also offer graduate education through the masters degree. All of the colleges and universities in this group enroll between 1,500 and 2,500 students.

Liberal Arts Colleges I: These highly selective institutions are primarily undergraduate colleges that award more than half of their baccalaureate degrees in arts and science fields.

Liberal Arts Colleges II: These institutions are primarily undergraduate colleges that are less selective and award

more than half of their degrees in liberal arts fields. This category also includes a group of colleges (identified with an asterisk) that award less than half of their degrees in liberal arts fields but, with fewer than 1,500 students, are too small to be considered comprehensive.

Two-Year Community, Junior and Technical Colleges: These institutions offer certificate or degree programs through the Associate of Arts level and, with few exceptions, offer no baccalaureate degrees.

Professional Schools and Other Specialized Institutions: These institutions offer degrees ranging from the bachelor's to the doctorate. At least 50 percent of the degrees awarded by these institutions are in a single specialized field. Specialized institutions include:

- Theological seminars, Bible colleges and other institutions offering degrees in religion: This category includes institutions at which the primary purpose is to offer religious instruction or train members of the clergy.
- Medical schools and medical centers: These institutions award most of their professional degrees in medicine. In some instances, their programs include other health professional schools, such as dentistry, pharmacy, or nursing.
- Other separate health profession schools: Institutions in this category award most of their

degrees in such fields as chiropractory, pharmacy, or podiatry.

- Schools of law: The schools included in this category award most of their degrees in law. The list includes only institutions that are listed as separate campuses in the Higher Education General Information Survey.
- Schools of engineering and technology: The institutions in this category award at least a bachelor's degree in programs limited almost exclusively to technical fields of study.
- Schools of business and management: The schools in this category award most of their bachelor's or graduate degrees in business or business-related programs.
- Schools of art, music, and design: Institutions in this category award most of their bachelor's or graduate degrees in art, music, design, architecture or some combination of such fields.

- Teachers colleges: Institutions in this category award most of their bachelor's or graduate degrees in education or education-related fields.
- Other specialized institutions: Institutions in this category include graduate centers, maritime academies, military institutes without liberal arts programs, and

institutions that do not fit any other classification category.

- Corporate sponsored institutions: These institutions are accredited, degree-granting colleges and universities established by profit-making corporations.

Notes on Definitions

1. The years used in calculating average federal support were 1983, 1984, and 1985.
2. The academic year for determining the number of degrees awarded by institutions was 1983-84.
3. The Liberal Arts disciplines include area studies, biological science, the fine arts, foreign languages, letters, mathematics, physical sciences, psychology, the social sciences, and interdisciplinary studies. Occupational/pre-professional disciplines include agriculture, the natural sciences, architecture and environmental design, business and management, communications, computer and information science, education, engineering, the health professions, home economics, law, library science, public affairs, and theology.
4. The years used for calculating average student enrollment were 1982, 1983, and 1984.
5. An index developed by Alexander W. Astin at the University of California at Los Angeles is used to determine the selectivity of liberal arts colleges.

6. This category lists only institutions that appear in Higher Education General Information Survey as separate campuses. Those seeking a complete listing of accredited professional schools should consult publications of the separate professional associations such as the annual report on medical education published by the American Medical Association.
7. Our list of corporate colleges and universities is taken from Eurich, Nell P., Corporate Classrooms: The Learning Business (Princeton, N.J., The Carnegie Foundation or the Advancement of Teaching, 1985). Since that report was published some of the institutions it included have become independent or part of other institutions.

APPENDIX C
INTERVIEW INSTRUMENT FOR DATA COLLECTION (COMPONENT WEIGHTS AND VALUES)

Introduction

The purpose of this questionnaire is to collect the data required to test a model designed to measure the quality of an institution of higher education. The model is based on the Attributive Theory of Quality and the Systems Theory. The former defines quality as the "composite (interactive) sum of the necessary and sufficient properties" making up a phenomenon, and as such, postulates that any phenomenon is a system made of a number of subsystems and components forming a hierarchy. To determine this sum, the value and weight of each subsystem is needed. Weight is defined as the contribution factor of each component (in percentage figure) to its respective subsystem at the next higher level of hierarchy.

For accreditation purposes, the Southern Association of Colleges and Schools views an institution higher education as a system made up of five major subsystems. These subsystems, in turn, break into smaller units until they are not further reducible. This study is aimed at collecting the weights and values for the library in an institution of higher education. Two levels of hierarchy exist before the

library. The weights and values of the components of these levels are assigned hypothetically, the latter as optimal (100), so as not affect the outcome of the variations in the library unit.

Illustration:

Note: Subsystems (typed in upper case) require weights only. Components (typed in lower case) need both weights and values. For the purposes of this study, the major subsystems of the institution -- other than the "Educational Support Services" -- are considered as components. Institution is divided into the following subsystems (components):

__10%__ Clear statement of purpose, value at 100.

__45%__ Educational programs, value at 100.

__10%__ Institutional effectiveness, value at 100.

__10%__ Administrative process, value at 100.

__25%__ EDUCATIONAL SUPPORT SERVICES, value to be calculated

__100%__ TOTAL

Educational support services is divided into these subsystems (components):

__10%__ Institutional Support, value as 100.

__30%__ Computer Resources, value at 100.

__15%__ Student Development, value at 100.

__5%__ Athletics, value as 100.

__40%__ LIBRARY, value to be calculated

Questionnaire:

Assign weights to subsystems (Values for components only):

_____ STAFF;

_____ COLLECTIONS;

_____ OFF-CAMPUS SITES;

_____ INSTITUTIONAL RELATIONSHIP;

_____ SERVICES.

_100%_ TOTAL

Assign weights and values to STAFF components:

_____ Professional degree, value at _____

_____ Technical/Specialized knowledge, value at _____

_____ Experience, value at _____

_____ Adequacy (Number per users), value at _____

_____ Employment conditions, value at _____

_100%_ TOTAL

Assign weights and values and values to COLLECTION components:

_____ Development activities, value at _____

_____ QUANTITY

_____ POLICIES

_100%_ TOTAL

QUANTITY

_____ EDUCATIONAL SUPPORT

_____ RESEARCH SUPPORT

_____ Public service support, value at _____

_100%_ TOTAL

EDUCATIONAL SUPPORT

_____ Graduate, value at _____

_____ Undergraduate, value at _____

_100%_ TOTAL

RESEARCH SUPPORT

_____ Graduate, value at _____

_____ Undergraduate, value at _____

_100%_ TOTAL

POLICIES

_____ Selection, value at _____

_____ Weeding, value at _____

_100%_ TOTAL

Assign weights and values to OFF-CAMPUS SITES components.

_____ Staff, value at _____

_____ Continuity/Availability, value at _____

_____ ADEQUACY OF SUPPORT SERVICES

_100%_ TOTAL

ADEQUACY OF SUPPORT SERVICES

_____ Course, value at _____

_____ Program, value at _____

_____ Degree, value at _____

_100%_ TOTAL

Assign weights to INSTITUTIONAL RELATIONSHIP components:

_____ Evaluation programs _____

_____ Safeguards for Integrity _____

_____ Safeguards for Continuity _____

_100%_ TOTAL

Assign weights to SERVICES components:

_____ EQUIPMENT

_____ PHYSICAL FACILITIES

_____ ORIENTATION PROGRAMS

_____ POINT-OF-USE INSTRUCTIONS

_____ Inter-library loans, value at _____

_____ Circulation systems, value at _____

100% TOTAL

EQUIPMENT

_____ Condition _____

_____ Age _____

_____ TYPES

100% TOTAL

TYPES

_____ Print, value at _____

_____ Non-print, value at _____

_____ Others (Copiers, etc.), value at _____

100% TOTAL

PHYSICAL FACILITIES

_____ SIZE

_____ ACCESSIBILITY

100% TOTAL

SIZE

_____ For collections, value at _____

_____ For services, value at _____

100% TOTAL

ACCESSIBILITY

_____ On-hand materials, value at _____

_____ Stored materials, value at _____

_100%_ TOTAL

ORIENTATION PROGRAMS

_____ Lectures, value at _____

_____ Library guides, value at _____

_____ Formal instruction, value at _____

_____ User aid, value at _____

_____ Self-paced instruction, value at _____

_____ Computer-assisted instruction, value at _____

_100%_ TOTAL

POINT-OF-USE INSTRUCTION

_____ Traditional reference services, value at _____

_____ Personal assistance, value at _____

_____ RECORDS OF MATERIALS

_100%_ TOTAL

RECORDS OF MATERIALS

_____ Catalogs, value at _____

_____ Indexes, value at _____

_____ Bibliographies, value at _____

_____ On-line systems, value at _____

_____ External databases, value at _____

_100%_ TOTAL

APPENDIX D
DOCUMENTATION FOR THE ATQ
CALCULATION MODEL

The present model is a menu-driven and user-friendly software. The documentation is written for individuals with basic knowledge of computers and Operations Systems. A basic knowledge of Lotus 1-2-3, nevertheless, would be helpful to the user.

1. Retrieve MODEL.WK1

Press / to display the Lotus menu

Press **F** to select File menu

Press **R** to select Retrieve command

Move highlight (cursor) on MODEL.WK1

Press **ENTER** to retrieve file

Main menu (SCREEN 1) displayed.

```
A3: (P0) PR 0
Enter Values  PctChange  Save   Quit and Save  Cancel
Enter component values
          A              B              C              D              E
1                  INSTITUTION C:          0.00
          A              B              C              D              E
3               0%             0%             0%             0%             0%
4       Purpose     Institutional  EDUCATIONAL   Educational  Administrative
5      Statement    Effectiveness  SUPPORT SERV    Programs     Processes
6             0.00           0.00           0.00           0.00           0.00
7                                    |
8          ------------------------------------------------------------
9          |              |              |              |              |
10              0%             0%             0%             0%             0%
11  Institutional     Computer       LIBRARY        Student       Athletics
12     Support       Resources                    Development
13            0.00           0.00           0.00           0.00           0.00
14                                   |
15         ------------------------------------------------------------
16         |              |              |              |              |
17              0%             0%             0%             0%             0%
18     SERVICES       LIBRARY       COLLECTION  INSTITUTIONAL   OFF-CAMPUS
19                     STAFF                     RELATIONSHIPS     SITES
20            0.00           0.00           0.00           0.00           0.00
14-Dec-90  08:05 AM                        CMD
```

2. Data entry

Press **P** to deactivate macros (unprotect the cells) to modify all the ranges (cells). Enter weights (percentage figures) now. Press **Alt M** to return to the main menu.

Press **E** to move to SCREEN 2 for data entry

Press **S** to save the changes you have made to the file.

Press **Q** to save the changes and exit 1-2-3.

Press **C** to cancel exit command

```
A3: (P0) PR 0
Services  LibStaff  Collections  InstRel  Off-Campus  Data  Main
Services Menu
          A              B              C              D              E
1                  INSTITUTION:              0.00
          A              B              C              D              E
3               0%             0%             0%             0%             0%
4       Purpose     Institutional  EDUCATIONAL    Educational  Administrative
5     Statement     Effectiveness  SUPPORT SERV     Programs      Processes
6            0.00           0.00           0.00           0.00           0.00
7                                    |
8         ---------------------------------------------------------
9         |              |              |              |              |
10              0%             0%             0%             0%             0%
11  Institutional     Computer       LIBRARY        Student       Athletics
12      Support       Resources                   Development
13           0.00           0.00           0.00           0.00           0.00
14                                   |
15        ---------------------------------------------------------
16        |              |              |              |              |
17              0%             0%             0%             0%             0%
18     SERVICES       LIBRARY       COLLECTION  INSTITUTIONAL   OFF-CAMPUS
19                     STAFF                     RELATIONSHIPS     SITES
20           0.00           0.00           0.00           0.00           0.00
14-Dec-90  08:07 AM                      CMD
```

SCREEN 2: INSTITUTION

NOTE: On all screens, when entering values in component cells, use the arrow keys to move the cursor (highlight). When finished, press **ENTER** to return to the menu of the screen you are working on to select other options.

Press **D** to start entering values for components (typed in lower case). The subsystems (typed in upper case will not accept data; their values will automatically be calculated).

Press **M** to return to the Main Menu.

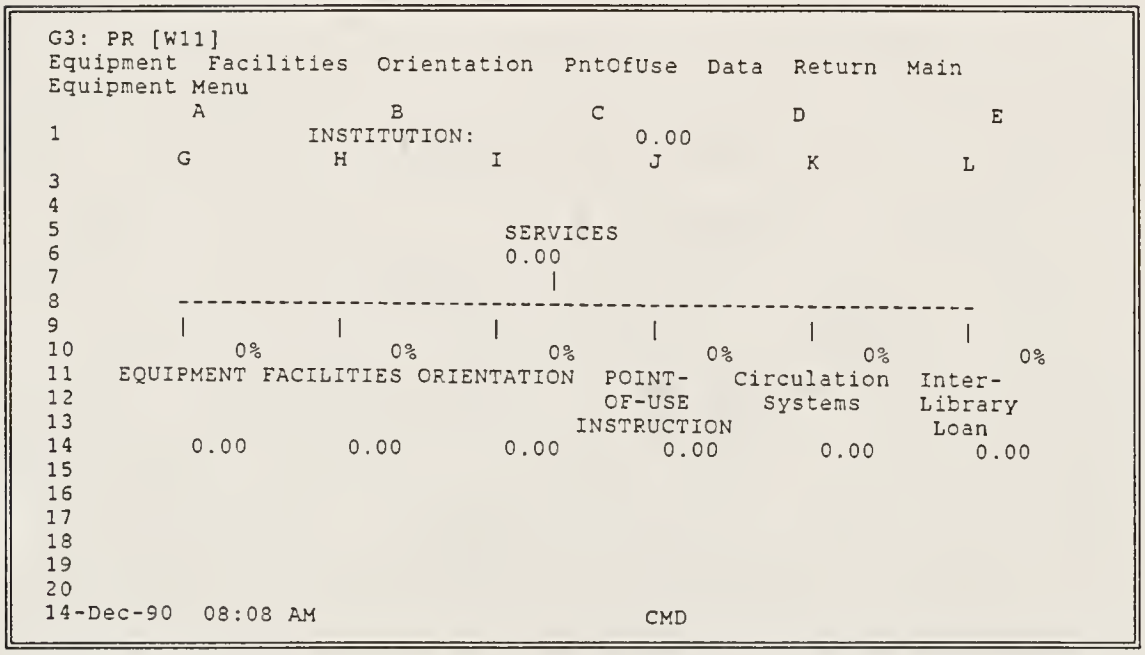
Press **S** to go to Service subsystem menu.

Press **L** to go to the Library Staff subsystem.

Press **C** to go to Collections subsystem.

Press **I** to go to Institutional Relationships subsystem.

Press **O** to go to Off-Campus subsystem.



SCREEN 3: SERVICES

Press **D** to enter values in components.

Press **R** to return to the previous screen (INSTITUTION).

Press **M** to return to the main menu.

Press **E** to go to the Equipment subsystem.

Press **F** to go to the Facilities subsystem.

Press **O** to go to the Orientation Programs subsystem.

Press **P** to go to the Point-of-Use Instruction subsystem.

```
A30: PR
Data  Return  Main
Enter this screen's data
          A              B              C              D              E
1                  INSTITUTION:              0.00
          A              B              C              D              E
30
31
32                                    EQUIPMENT
33                                          0.00
34                                          |
35                         ------------------------------
36                         |                |              |
37                               0%               0%             0%
38                        Age              TYPE         Condition
39                            0.00             0.00           0.00
40                                          |
41                         ------------------------------
42                         |                |              |
43                               0%               0%             0%
44                       Print         Non-Print        Others
45                            0.00             0.00           0.00
46
47
14-Dec-90  08:09 AM                          CMD
```

SCREEN 4: EQUIPMENT

Press **D** to enter values in components.

Press **R** to return to the previous screen (SERVICES subsystem)

Press **M** to return to the Main menu.

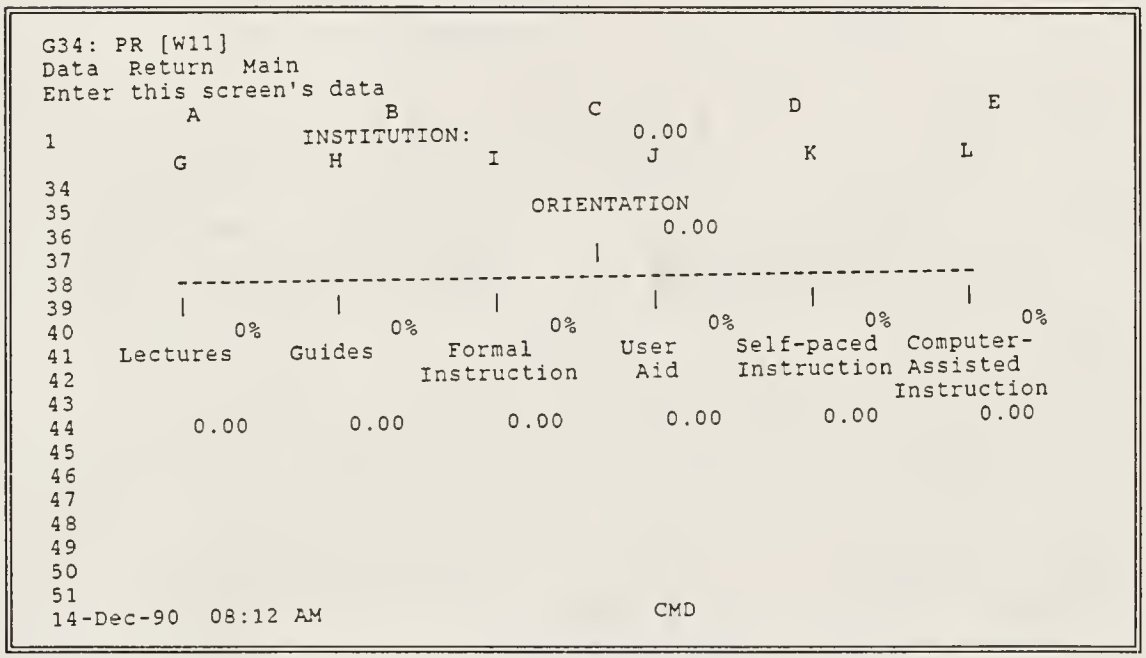
```
A59: PR
Data  Return  Main
Enter this screen's data
          A              B              C              D              E
1                  INSTITUTION:              0.00
          A              B              C              D              E
59
60                                    FACILITIES
61                                          0.00
62                                          |
63                         ------------------------------
64                         |                              |
65                               0%                             0%
66                        SIZE                        ACCESSIBILITY
67                            0.00                           0.00
68                         |                                 |
69          ---------------                                  ---------------
70          |              |                                 |              |
71                 0%              0%                             0%             0%
72          For            For                          On-Hand        Stored
73     Collections     Services                        Materials     Materials
74               0.00           0.00                           0.00           0.00
75
76
14-Dec-90  08:10 AM                          CMD
```

SCREEN 5: FACILITIES

Press **D** to enter values in components.

Press **R** to return to the previous screen (SERVICES subsystem)

Press **M** to return to the Main menu.



SCREEN 6: ORIENTATION

Press **D** to enter values in the components.

Press **R** to return to the previous screen (SERVICE subsystem)

Press **M** to return to the Main menu.

```
A84: PR
Data  Return  Main
Enter this screen's data
          A              B              C              D              E
1                  INSTITUTION:                0.00
          A              B              C              D              E
84
85                                POINT-OF-USE
86                                INSTRUCTION
87                                      0.00
88                                      |
89        ------------------------------------------------------------
90        |                               |                           |
91              0%                              0%                          0%
92    Traditional                     RECORDS OF                   Personal
93      Services                      MATERIALS                   Assistance
94            0.00                          0.00                        0.00
95                                      |
96        ------------------------------------------------------------
97        |             |             |             |             |
98              21%           22%           12%           29%           16%
99      Catalog       Indexes    Bibliographies   On-Line       External
100                                                Systems      Databases
101           0.00          0.00          0.00          0.00          0.00
14-Dec-90  08:13 AM                      CMD
```

SCREEN 7: POINT-OF-USE INSTRUCTION

Press **D** to enter values in the components.

Press **R** to return to the previous screen (SERVICE subsystem)

Press **M** to return to the Main menu.

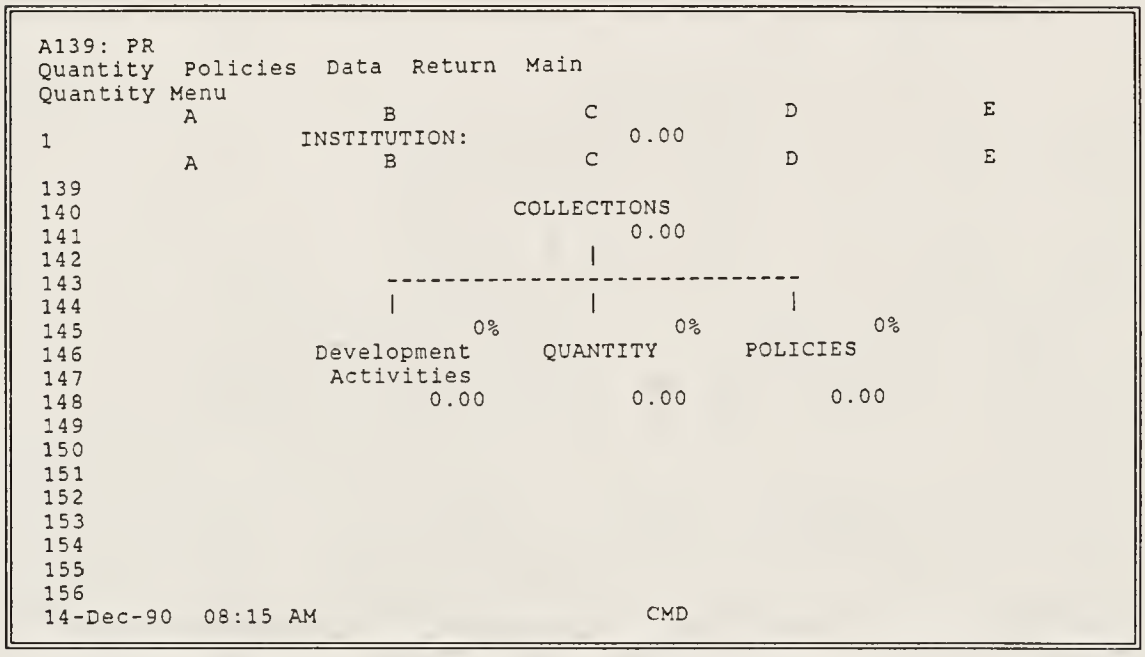
```
A114: PR
Data  Return  Main
Enter this screen's data
          A              B              C              D              E
1                  INSTITUTION:                0.00
          A              B              C              D              E
114
115                                   STAFF
116                                     0.00
117                                     |
118       ------------------------------------------------------------
119       |             |             |             |             |
120             0%            0%            0%            0%            0%
121   Professional   Technical/    Experience    Adequacy/     Employment
122      Degree     Specialized                   Number       Condition
123                  Knowledge
124           0.00          0.00          0.00          0.00          0.00
125
126
127
128
129
130
131
14-Dec-90  08:14 AM                      CMD
```

SCREEN 8: STAFF

Press **D** to enter values in the components.

Press **R** to return to the previous screen (INSTITUTION)

Press **M** to return to the Main menu.



SCREEN 9: COLLECTIONS

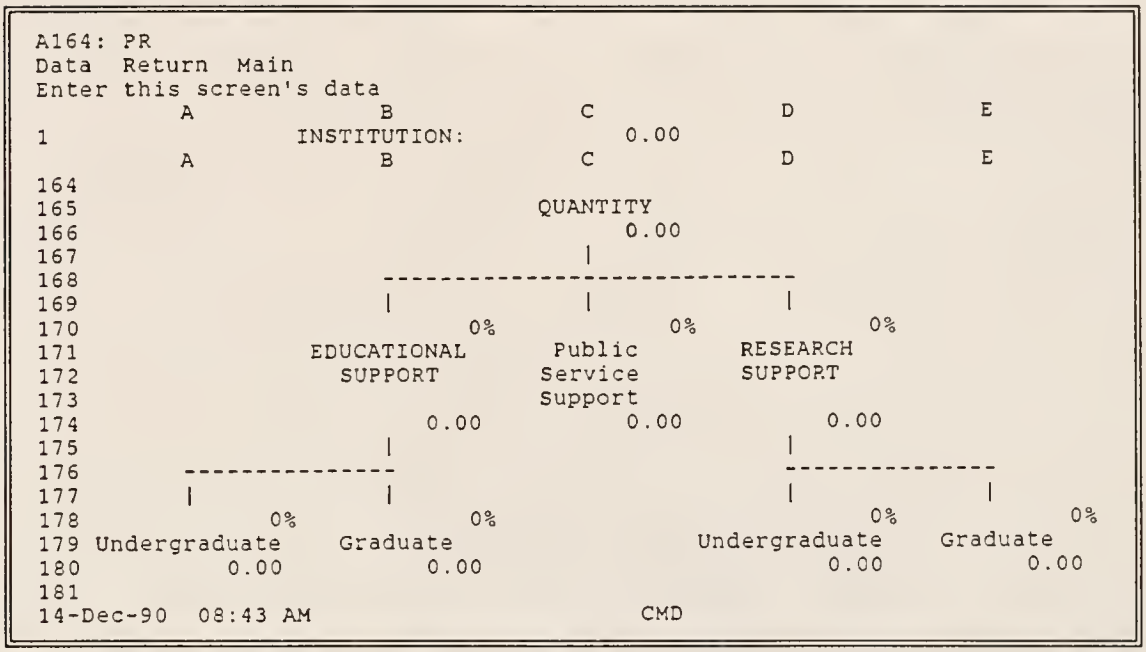
Press **D** to enter values in the component.

Press **Q** to go to the Quantity subsystem.

Press **P** to go to the Policies subsystem.

Press **R** to return to the previous screen (INSTITUTION)

Press **M** to return to the Main menu.

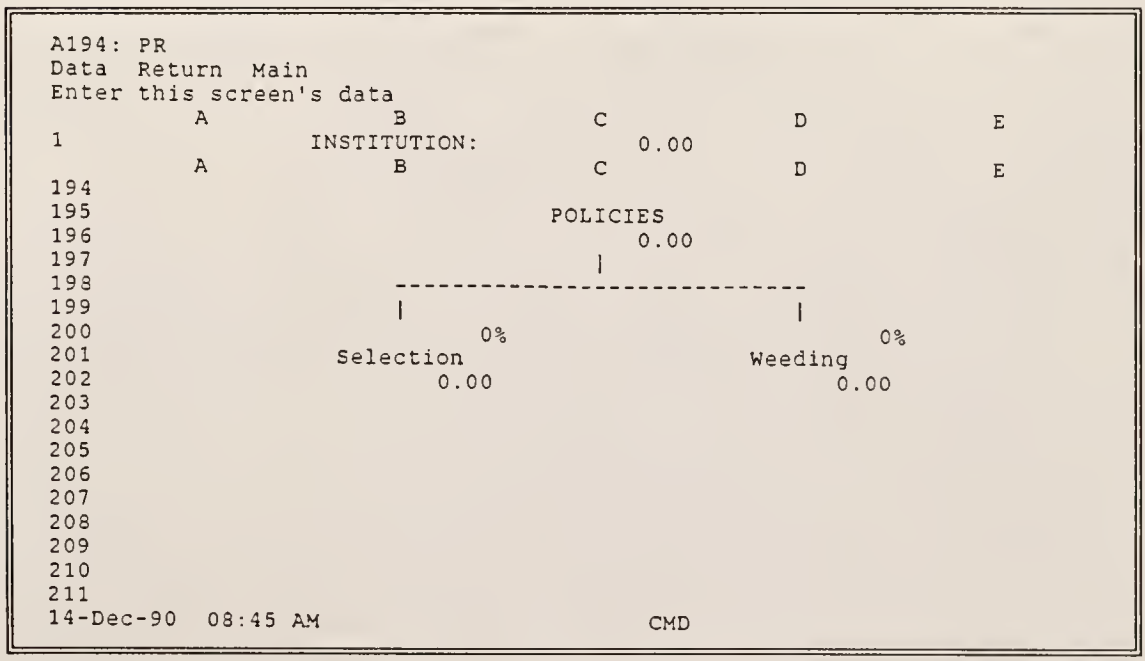


SCREEN 10: QUANTITY

Press **D** to enter values in the components.

Press **R** to return to the previous screen (COLLECTION)

Press **M** to return to the Main menu.

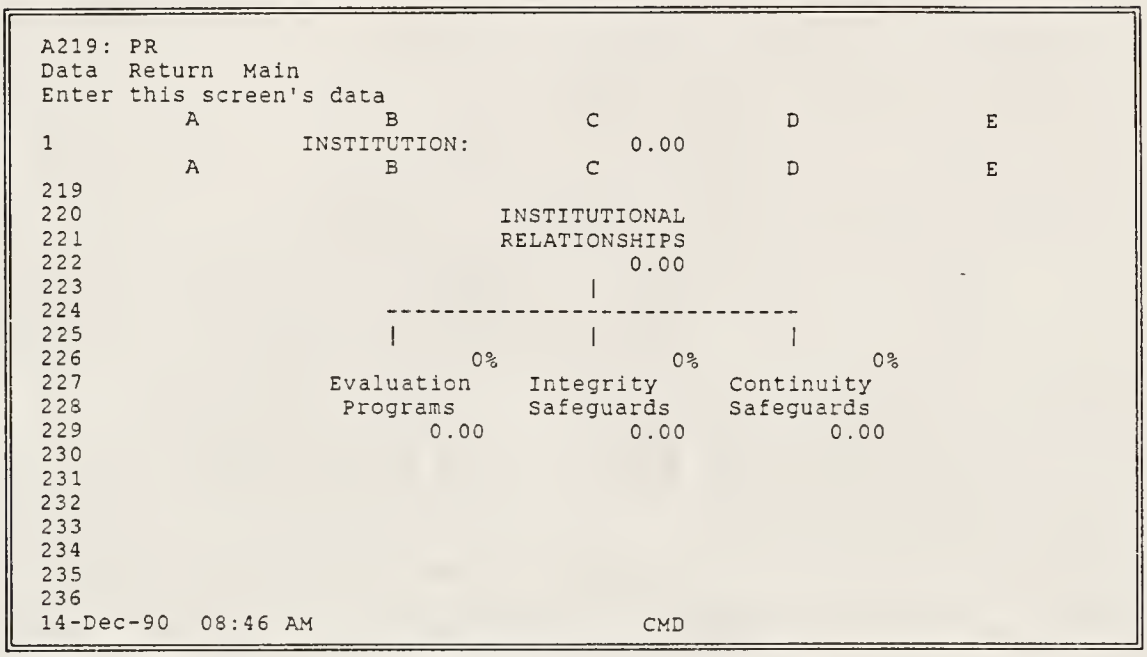


SCREEN 11: POLICIES

Press **D** to enter values in the components.

Press **R** to return to the previous screen (COLLECTION)

Press **M** to return to the Main menu.

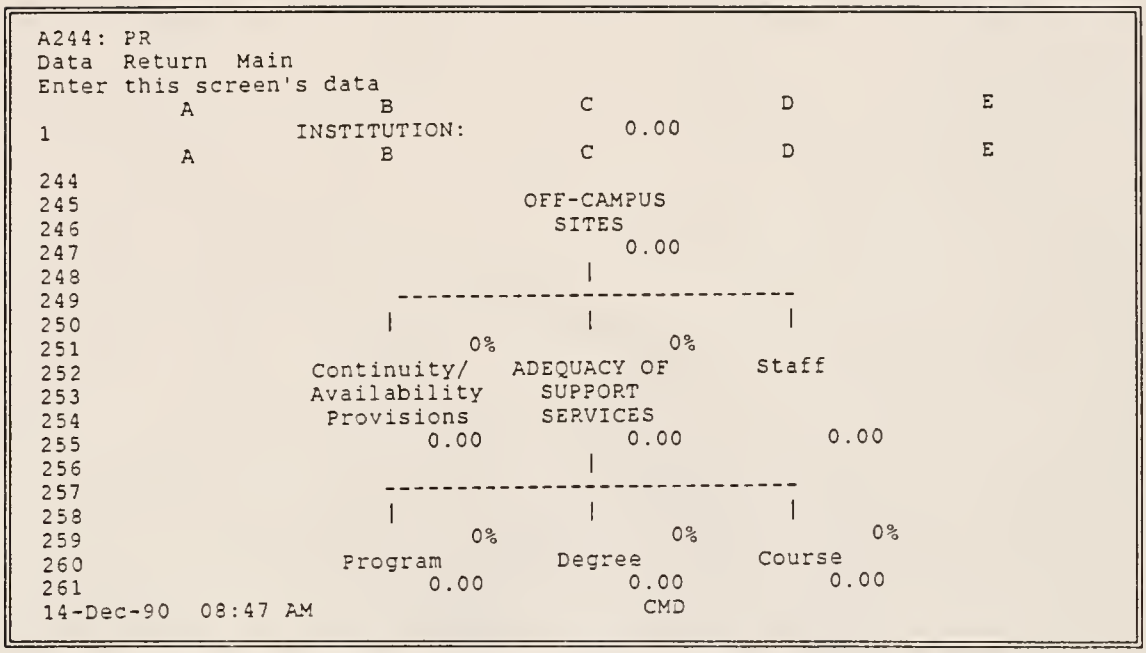


SCREEN 12: INSTITUTIONAL RELATIONSHIPS

Press **D** to enter values in the components.

Press **R** to return to the previous screen (INSTITUTION)

Press **M** to return to the Main menu.



SCREEN 13: OFF-CAMPUS SITES

Press **D** to enter values in the components.

Press **R** to return to the previous screen (INSTITUTION)

Press **M** to return to the Main menu.

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BIOGRAPHICAL SKETCH

Arash Afshar was born and raised in Isfahan, Iran, where he lived until the end of his high school years. He subsequently moved to Tehran to attend the College of Mass Communications, from which he graduated with a B.A. in journalism (1973). Later, he attended Tehran University and graduated with an M.A. in linguistics in 1980.

From 1970 to 1973 he worked as a civilian ESL (English as a Second Language) instructor and training supervisor for the Imperial Iranian Air Force. After a two-year military service and a one-year practice in business, he started working as an English and Translation instructor and the Director of Administration for the College of Mass Communication. He held these positions until 1980 when he moved to Athens, Greece.

In Athens, he was the Resident Consultant for the center of studies of the Florida-based Embry-Riddle Aeronautical University, working with students and faculty from several European, African, and Middle-Eastern countries until 1985 when he was transferred stateside. Here, he worked as the Director of Personnel for the International Campus, and later as the Associate Dean of the U.S. Division. In the latter position, while conducting systems

analysis and trouble-shooting, he identified the need for an in-house training department for the campus. The position was established and he was selected for the job in 1986. In 1987, the duties of the position was expanded to include the whole university.

Afshar has developed several training manuals and modules and has delivered management and supervisory training sessions. He also teaches technical writing courses as an adjunct faculty at the University and the local community college. He was a speaker at the ASEE/PSW conference (Los Angeles, 1987) and at the National Seminar for Successful College Teaching (Orlando, 1988) and the National Seminar for Successful College Administration (Orlando, 1988).

Currently, he is a member of the Executive Board and newsletter editor of Multicultural Network of the American Society for Training and Development (ASTD), and the Region 9 Coordinator of the Network. He is in the process of forming a satellite ASTD chapter (Central Florida) in Daytona Beach. He also trains bonsai and grows orchids and herbs. He is the 1990-1992 president of the KAWA Bonsai Society.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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